DOCUMENT RESUME

ED 158 104 08 CE 017 582

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TITLE	Multiple Learning Strategies Project. Small Engine Repair Service. Low Reader-Educable Mentally Impaired. [Vol. 2.]
INSTITUTION	Ingham Intermediate School District, Mason, Mich. Capital Area Career Center.
SPONS AGENCY	Bureau of Occupational and Adult Education (DHEW/OE), Washington, D.C.
BUREAU NO	498AH60038
PUB DATE	Jan 78
GRANT	G007603808
NOTE	481p.; For related documents see CE 017 554-583
EDRS PRICE	MF-$1.00 HC-$26.11 Plus Postage.
DESCRIPTORS	*Auto Mechanics; *Educable Mentally Handicapped; Engines; *Learning Activities; Learning Modules; Reading Level; Repair; *Retarded Readers; Special Education; *Trade and Industrial Education; *Vocational Education; Young Adults

ABSTRACT

This instructional package, one of two designed for low reader-educable mentally impaired students, focuses on the vocational area of small engine repair service. (Low readers are identified as those at a reading level of grades 3-6.) Contained in this document are fifty learning modules organized into twelve units: sharpening and grinding mowers; test equipment; motorcycles; engine removal and replacement; machining; tune-ups; short blocks; storage; filling out forms; ring and piston service; valve service; and overhaul. Each module includes these elements: a performance objective page that describes what the student will learn, materials needed, and how performance will be evaluated; information pages including special material not incorporated into the job steps; and job step pages which detail the steps necessary to do the task. (This document and CE 017 581 are one of three sets of learning modules on small engine repair written in formats designed for low reader-educable mentally impaired, visually impaired, and regular vocational students. These modules are part of a total set which includes over 1,300 modules written in a variety of formats on building maintenance, dietetic assistant, small engine repair, medical assistant, and graphics.) (JH)

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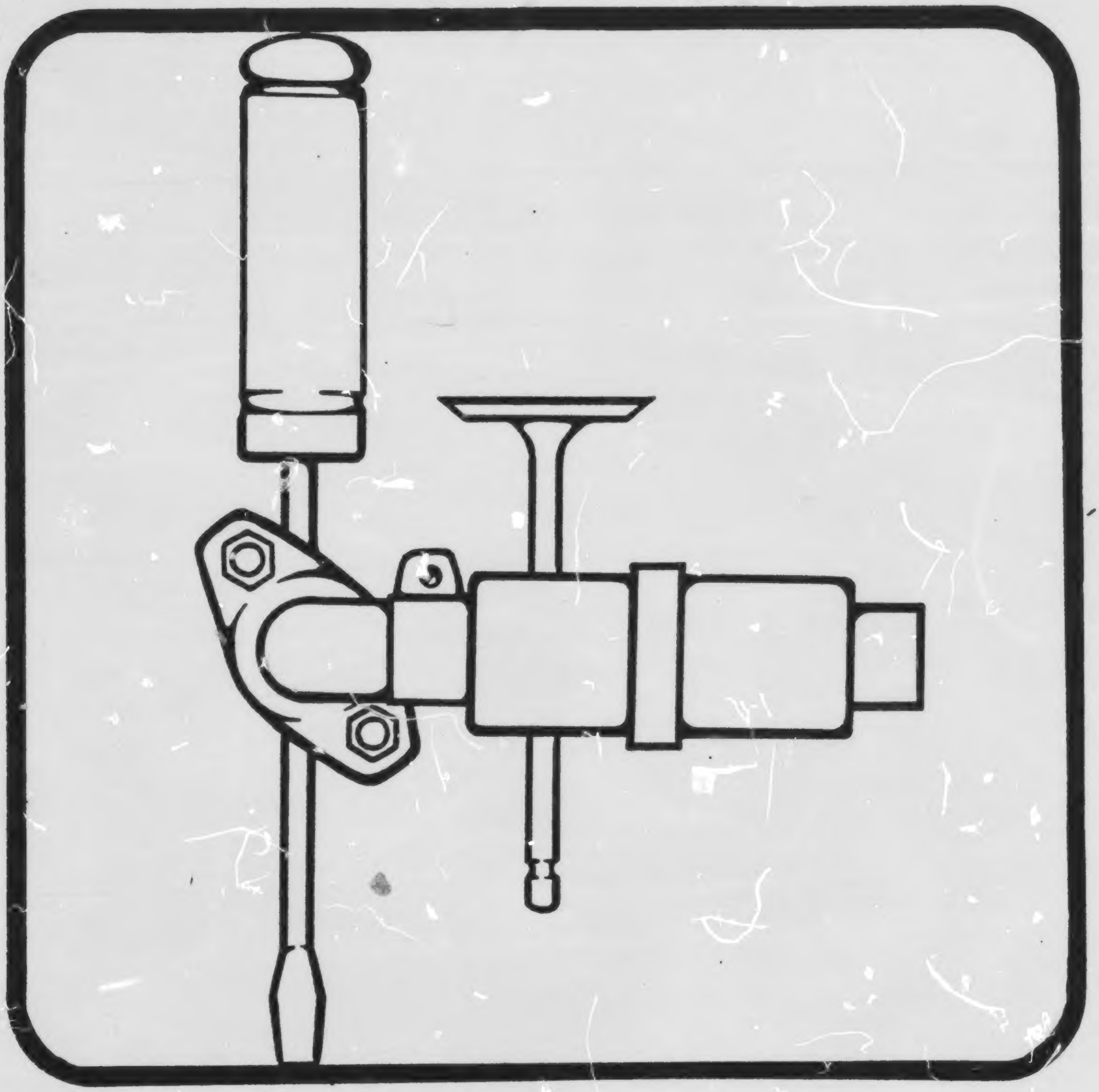
CAPITAL AREA CAREER CENTER
Ingham Intermediate School District
611 Hagadorn Road
Mason, Michigan 48854

TO:
MULTIPLE LEARNING STRATEGIES PROJECT

SMALL ENGINE REPAIR SERVICE
Low Reader-Educable Mentally Impaired
[VOL. 2]

2

CE 017 582



small engine repair

unit: SHARPENING AND GRINDING MOWERS

capital area career center

module: 7501 11 001 1
7501 11 001 3 date: JANUARY 1978 level: III

skill title: SHARPENING ROTARY MOWER BLADES AND BALANCE

developed & written by: DEBI WHITE

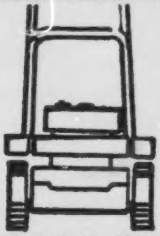
visuals by: DAVE WEHRWEIN & BRUCE BENNETT

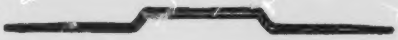
PERFORMANCE OBJECTIVE

YOU ARE GOING TO LEARN:

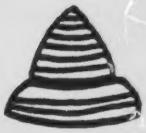
HOW TO SHARPEN AND BALANCE A ROTARY MOWER BLADE.

AND IN ORDER TO DO THIS YOU WILL NEED:


ROTARY MOWER


BLADE

BENCH & PEDESTAL GRINDER, WIRE WHEEL


BLADE BALANCER

IMPACT WRENCH & SOCKET

FILE

BENCH VISE

SAFETY GLASSES

WE WILL KNOW YOU CAN DO IT WHEN:

1. YOU READ THE MODULE.
2. YOU GET YOUR EQUIPMENT.
3. YOU HAVE SHARPENED AND BALANCED ROTARY MOWER BLADES.
4. YOU HAVE CLEANED YOUR WORK AREA AND PUT AWAY YOUR TOOLS.

"TURN THE PAGE"

WORD GUIDE

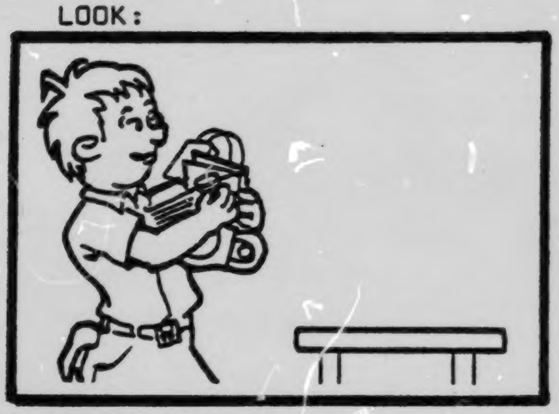
DULL - NOT SHARP; WILL NOT CUT

DAMAGE - HURT

JOB STEPS

READ: LOOK:

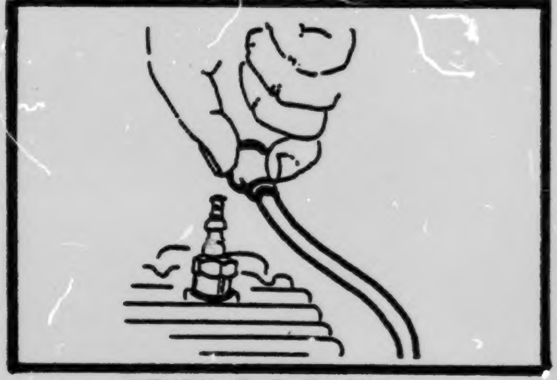
1. GET ALL OF YOUR EQUIPMENT AND TAKE IT TO YOUR WORK AREA.



CHECK: ASK YOUR INSTRUCTOR TO SEE IF YOU HAVE ALL YOUR EQUIPMENT.

2. THE LAWN MOWER BLADE MUST BE SHARP AND BALANCED. A DULL BLADE WILL BEAT THE GRASS DOWN. A BLADE THAT IS NOT BALANCED WILL SHAKE AND DAMAGE THE ENGINE.
TELL YOUR INSTRUCTOR WHAT A DULL OR UNBALANCED BLADE WILL DO.

3. REMOVE SPARK PLUG WIRE FROM THE SPARK PLUG.



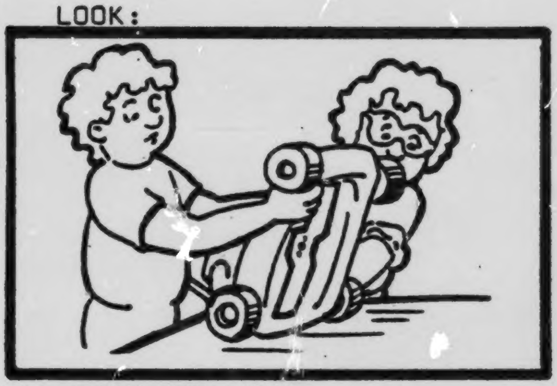
"TURN THE PAGE"

JOB STEPS

READAD:

LOOK:

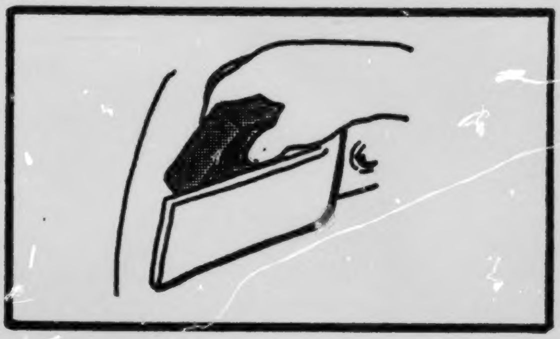
4. LIFT THE MOWER ONTO THE BENCH. GET HELP IF NEEDED. PUT ON YOUR SAFETY GLASSES.
NOTE: THE VALVE CHAMBER BREATHER MUST BE UP (SO OIL DOES NOT LEAK ONTO THE HEAD).



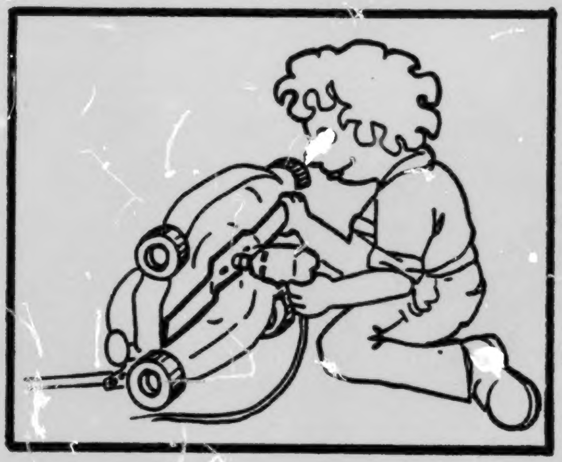
CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

1. TOLD YOUR INSTRUCTOR WHAT A DULL OR UNBALANCED BLADE WILL DO.
2. REMOVED THE SPARK PLUG WIRE.
3. PLACED THE MOWER ON THE BENCH.
4. YOUR SAFETY GLASSES ON.

5. BLOCK THE BLADE WITH A LARGE PIECE OF WOOD SO IT WILL NOT TURN COUNTER-CLOCKWISE.



6. GET THE IMPACT WRENCH AND THE RIGHT SIX-POINT SOCKET. PUT THE WRENCH ON THE BLADE NUT AND RUN THE IMPACT WRENCH SO THE NUT COMES OFF. WHEN THE NUT COMES OFF, KEEP THE BLADE AND WASHERS IN A SAFE PLACE. DON'T LOSE THEM.

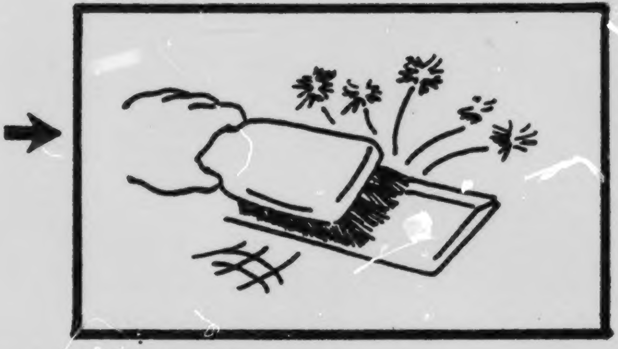


"TURN THE PAGE"

JOB STEPS

READ: LOOK:

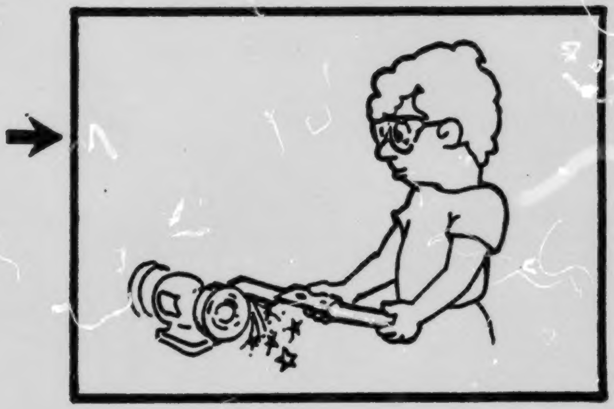
7. CLEAN OLD GRASS AND DIRT OFF THE MOWER HOUSING AND BLADE. USE A WIRE BRUSH.



CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

1. BLOCKED THE BLADE WITH WOOD.
2. REMOVED THE NUT USING THE IMPACT WRENCH.
3. CLEANED THE MOWER HOUSING AND BLADE.

8. GRIND ONE SIDE OF THE BLADE TO TAKE OUT NICKS. ASK YOUR INSTRUCTOR TO HELP.



9. GRIND THE OTHER SIDE OF THE BLADE. GRIND THE SAME DISTANCE ON BOTH ENDS OF THE BLADE. ASK YOUR INSTRUCTOR TO WATCH YOU WORK.

CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

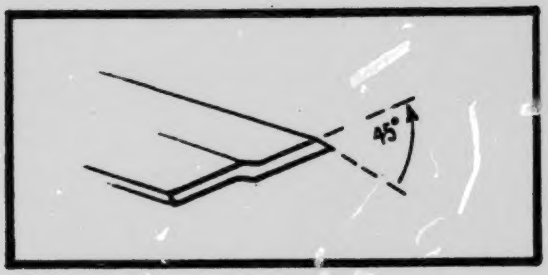
1. DONE THE GRINDING IN THE RIGHT WAY.

"TURN THE PAGE"

JOB STEPS

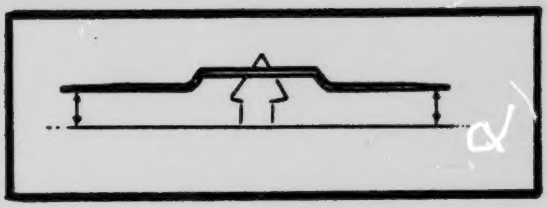
READD: LOOK:

10. TURN THE BLADE OVER. GRIND A 45° ANGLE ON THE BLADE. ASK YOUR INSTRUCTOR TO WATCH. WHEN YOU START GRINDING, SPARKS WILL FLY. WHEN THE EDGE IS SHARP, THE SPARKS WILL FOLLOW DOWN THE BOTTOM SIDE OF THE BLADE.



11. PUT THE BLADE ON THE BALANCER.

NOTE: ONE END MAY BE HEAVY. THIS END WILL GO DOWN. YOU MUST GRIND THE HEAVY END UNTIL THE BLADE BALANCES. DON'T GRIND TOO MUCH - JUST A LITTLE.



CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

1. GROUND A 45° ANGLE ON THE BLADE.
2. BALANCED THE BLADE BY GRINDING, IF NECESSARY.

12. CHECK THE WASHERS THAT GO ON THE BLADE. PUT NEW ONES ON IF NEEDED. SHOW THE OLD WASHERS TO YOUR INSTRUCTOR. HE/SHE WILL TELL YOU IF YOU NEED NEW WASHERS.

13. PUT NEW HUBS ON IF ANY OF THEM ARE BROKEN.

"TURN THE PAGE"

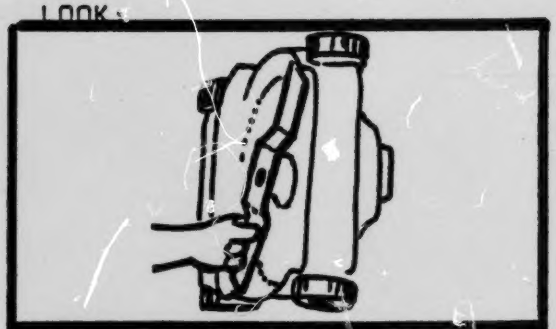
JOB STEPS

READ:

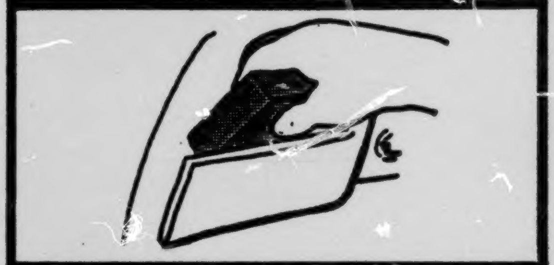
LOOK:

14. PUT THE BLADE AND WASHERS BACK ON.

NOTE: PUT EVERYTHING BACK ON IN THE ORDER YOU TOOK IT OFF. CHECK TO BE SURE THAT THE SPARK PLUG WIRE HAS BEEN REMOVED.

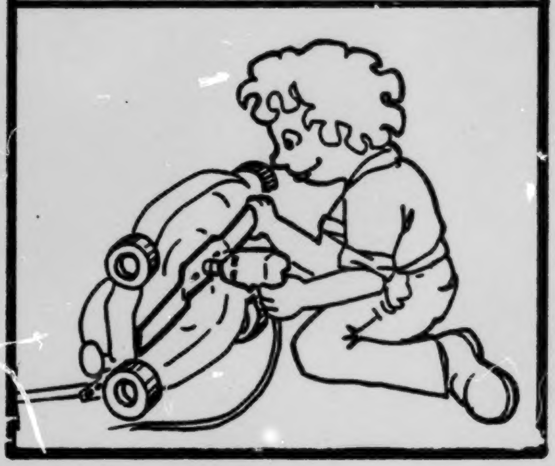


15. PUT THE BLOCK OF WOOD SO IT WILL KEEP THE BLADES FROM MOVING CLOCKWISE.



16. TIGHTEN THE BLADE WITH THE IMPACT WRENCH. ASK YOUR INSTRUCTOR TO CHECK THE BLADE.

NOTE: DO NOT START THE ENGINE UNTIL YOUR INSTRUCTOR CHECKS THE BLADE.



CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

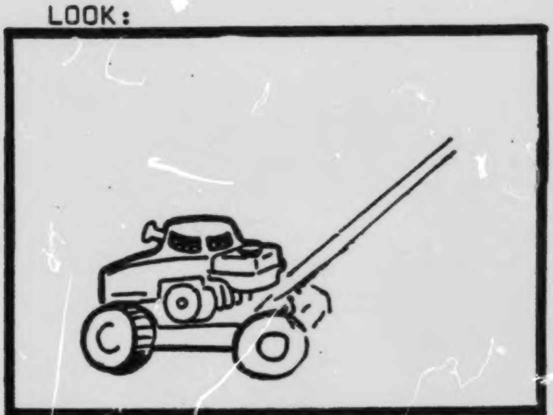
1. REPLACED THE WASHERS ON THE BLADE IF NEEDED.
2. PUT NEW HUBS ON IF NEEDED.
3. PUT THE BLADE AND WASHERS BACK ON.
4. PUT THE BLOCK OF WOOD TO KEEP THE BLADE FROM MOVING.
5. TIGHTENED THE BLADE WITH THE IMPACT WRENCH.
6. STARTED THE ENGINE AFTER YOUR INSTRUCTOR CHECKS THE BLADE.

"TURN THE PAGE"

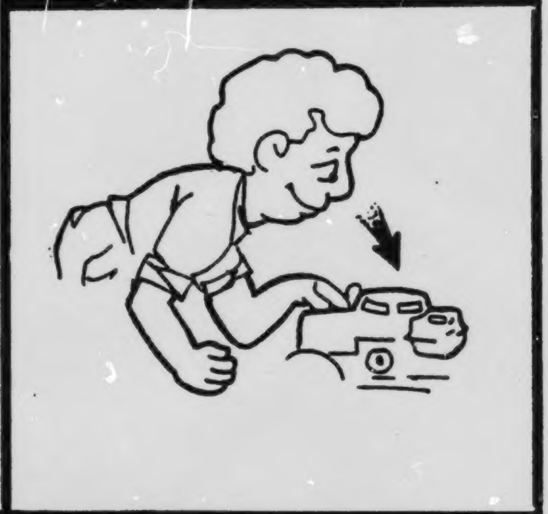
JOB STEPS

READ: LOOK:

17. PUT THE MOWER ON THE FLOOR. GET HELP IF NEEDED.



18. CHECK THE OIL.



19. CHECK THE GAS.

20. LOOK UNDER THE MOWER -- BE SURE THERE IS NOTHING UNDER THE MOWER. ASK YOUR INSTRUCTOR TO START THE MOWER AND TO CHECK THAT IT IS RUNNING RIGHT. WATCH YOUR INSTRUCTOR. ASK QUESTIONS. REPEAT ANY JOB STEPS THAT YOU NEED TO.

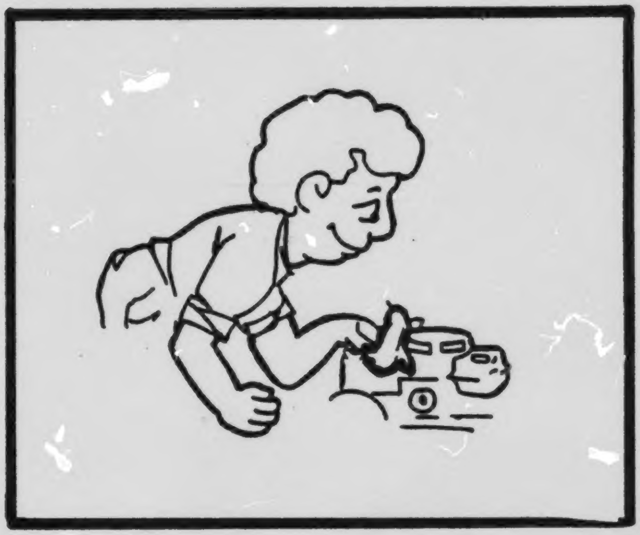
"TURN THE PAGE"

JOB STEPS

READ: LOOK:

21. STOP THE ENGINE. TURN THE MOWER OFF.

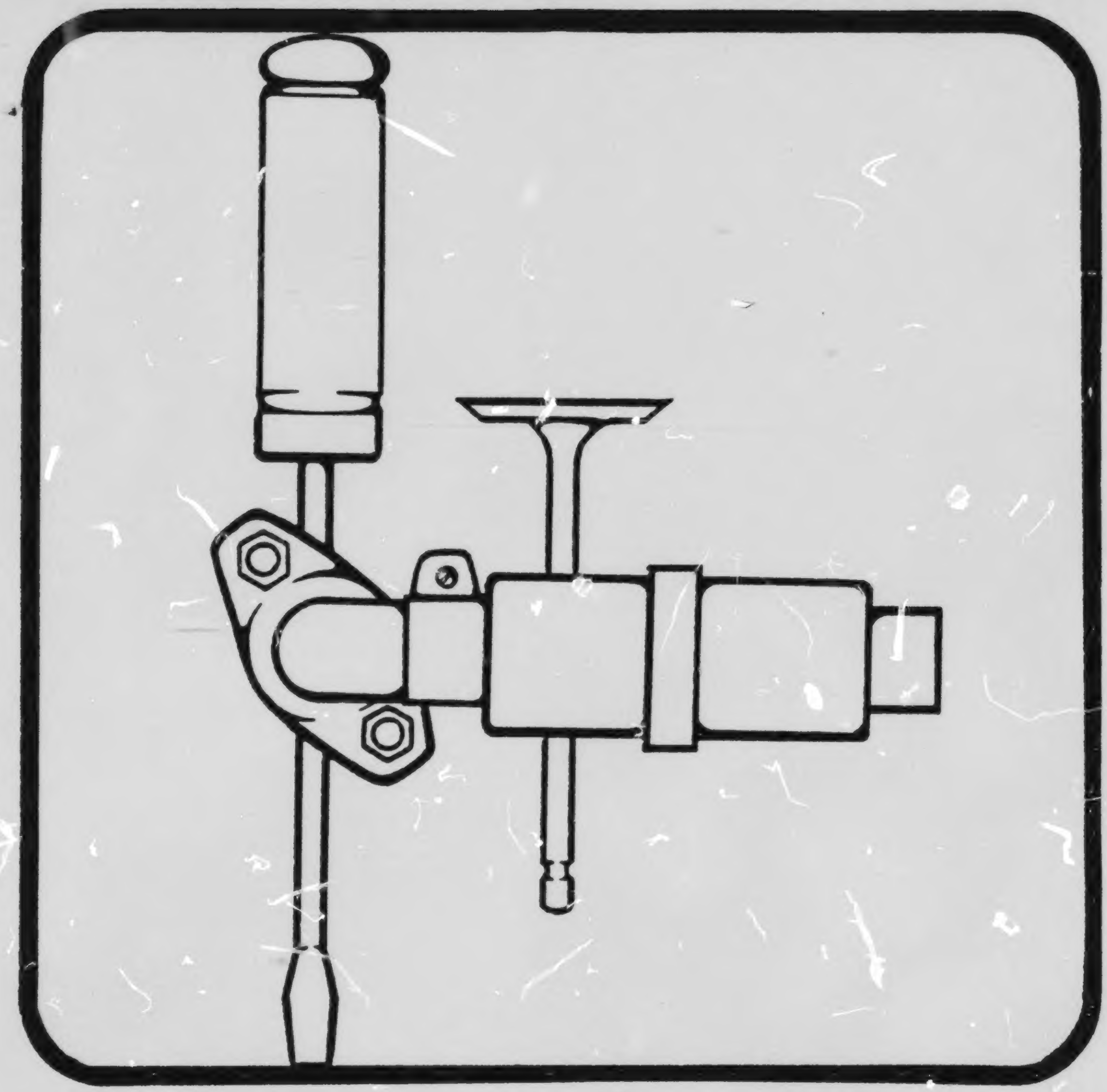
22. WIPE THE MOWER OFF. IT SHOULD BE READY FOR THE CUSTOMER TO PICK IT UP. →



23. PUT YOUR TOOLS AWAY. CLEAN UP YOUR WORK AREA.

CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

1. PUT THE MOWER ON THE FLOOR WITH HELP IF NEEDED.
2. CHECKED THE OIL.
3. CHECKED THE GAS.
4. WATCHED THE INSTRUCTOR START THE ENGINE.
5. STOPPED THE ENGINE AND TURNED OFF THE MOWER.
6. PUT YOUR TOOLS AWAY.
7. CLEANED UP YOUR WORK AREA.



small engine repair

unit: TESTS

capital area career center

module: 7501 13 001 1
7501 13 001 3 date: MAY 1978 level: I

skill title: CONDENSER CAPACITY TEST

developed & written by: JACK HELDER

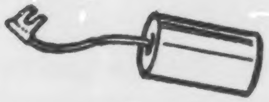
visuals by: DAVE WEHRWEIN

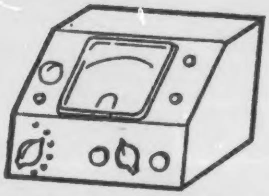
PERFORMANCE OBJECTIVE

YOU ARE GOING TO LEARN:

HOW TO TEST A CONDENSER FOR CAPACITY USING A MERCOTRONIC TESTER.

AND IN ORDER TO DO THIS YOU WILL NEED:


A CONDENSER


MERCOTRONIC TESTER

MERCOTRONIC
MANUAL

WE WILL KNOW YOU CAN DO IT WHEN:

1. YOU HAVE GATHERED YOUR EQUIPMENT.
2. YOU CAN HOOK UP THE TESTER IN THE RIGHT WAY.
3. YOU TEST THE CONDENSER CAPACITY.
4. YOU CHECK THE MANUAL TO FIND OUT WHAT AMOUNT OF CAPACITY THE CONDENSER MUST HAVE.
5. YOU TELL YOUR INSTRUCTOR IF THE CONDENSER IS GOOD OR BAD.

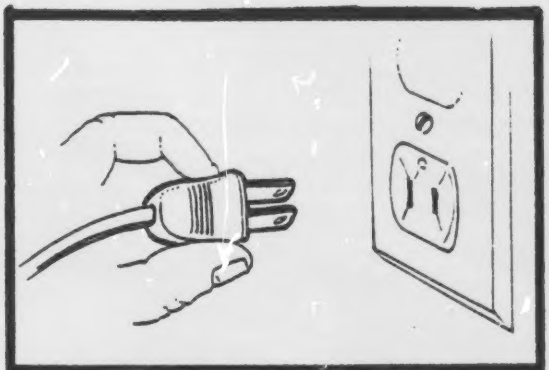
"TURN THE PAGE"

JOB STEPS

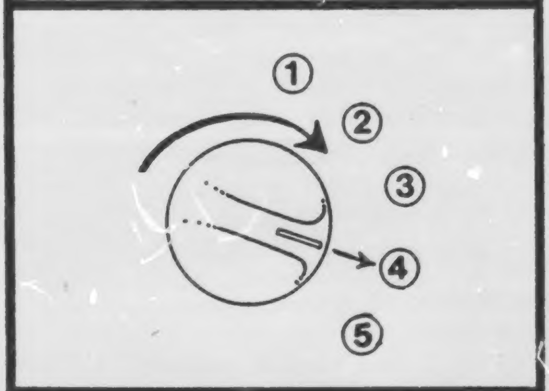
READ: LOOK:

1. TAKE ALL EQUIPMENT TO YOUR WORK AREA.

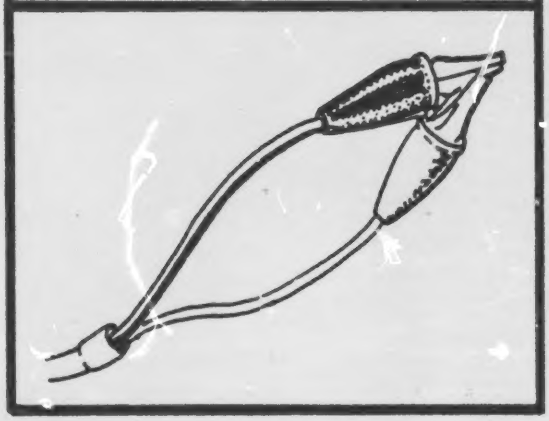
2. PLUG IN THE MERCOTRONIC TESTER. USE A NORMAL 115 VOLT OUTLET. →



3. PUT SELECTOR SWITCH ON POSITION 4, CONDENSER CAPACITY. →



4. CLIP TOGETHER THE SMALL RED AND BLACK TEST LEADS. →



"TURN THE PAGE"

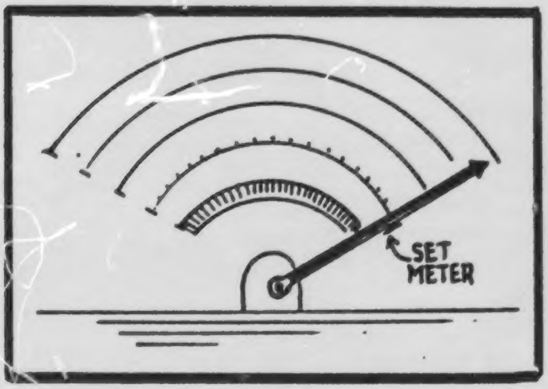
JOB STEPS

READ: LOOK:

5. PUSH IN RED BUTTON AND HOLD IT UNTIL DONE WITH STEP 6.

6. TURN METER ADJUSTMENT KNOB SO THAT NEEDLE MOVES TO THE SET LINE ON THE RIGHT SIDE OF THE METER.

→

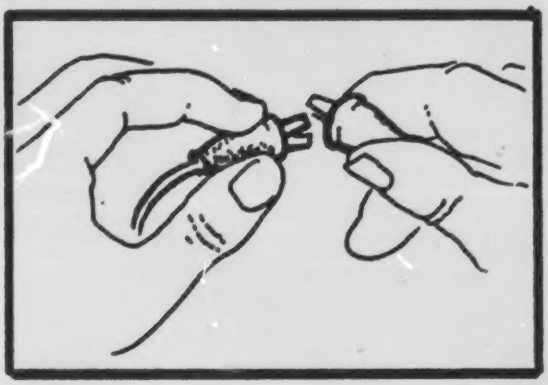


CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

1. SET THE SELECTOR SWITCH ON POSITION 4.
2. SET THE NEEDLE ON THE SET LINE ON THE RIGHT SIDE OF THE METER.

7. UNCLIP TEST LEADS.

→



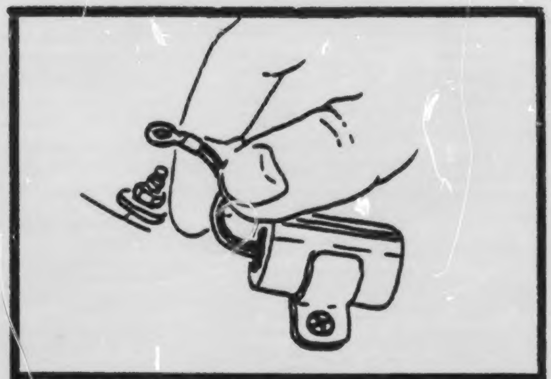
"TURN THE PAGE"

JOB STEPS

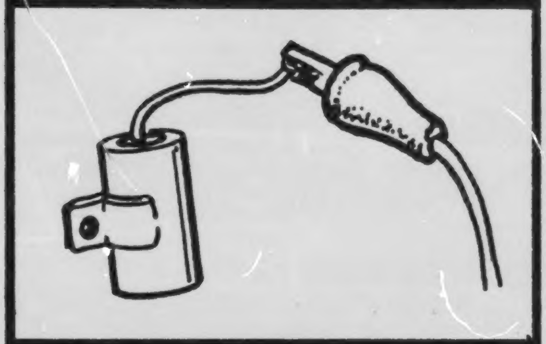
READ: LOOK:

8. DISCONNECT CONDENSER LEAD FROM TERMINAL POST ON THE ENGINE.

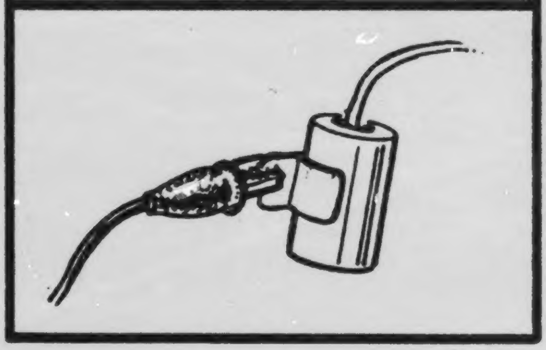
NOTE: IF CONDENSER IS NOT ON ENGINE, DO NOT DO STEP 8.



9. CLIP RED TEST LEAD TO CONDENSER LEAD.



10. CLIP BLACK TEST LEAD TO CONDENSER HOLD-DOWN BRACKET.



CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

1. CLIPPED THE RED TEST LEAD TO THE CONDENSER LEAD.
2. CLIPPED BLACK TEST LEAD TO THE CONDENSER HOLD-DOWN BRACKET.

"TURN THE PAGE"

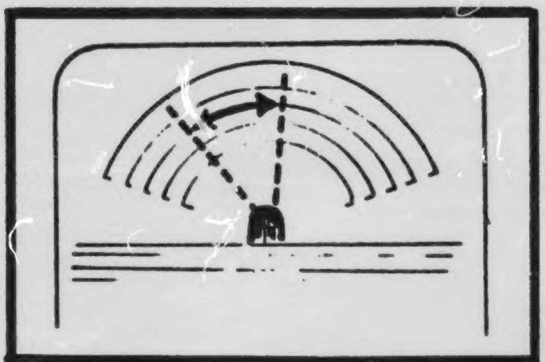
JOB STEPS

READ:

LOOK:

11. PUSH DOWN RED BUTTON AND READ SCALE 4.

NOTE: A 294628 CONDENSER SHOULD READ BETWEEN 16 - 26 MICROFARADS. IF YOU HAVE A DIFFERENT CONDENSER, CHECK THE MANUAL OR ASK YOUR INSTRUCTOR TO HELP.

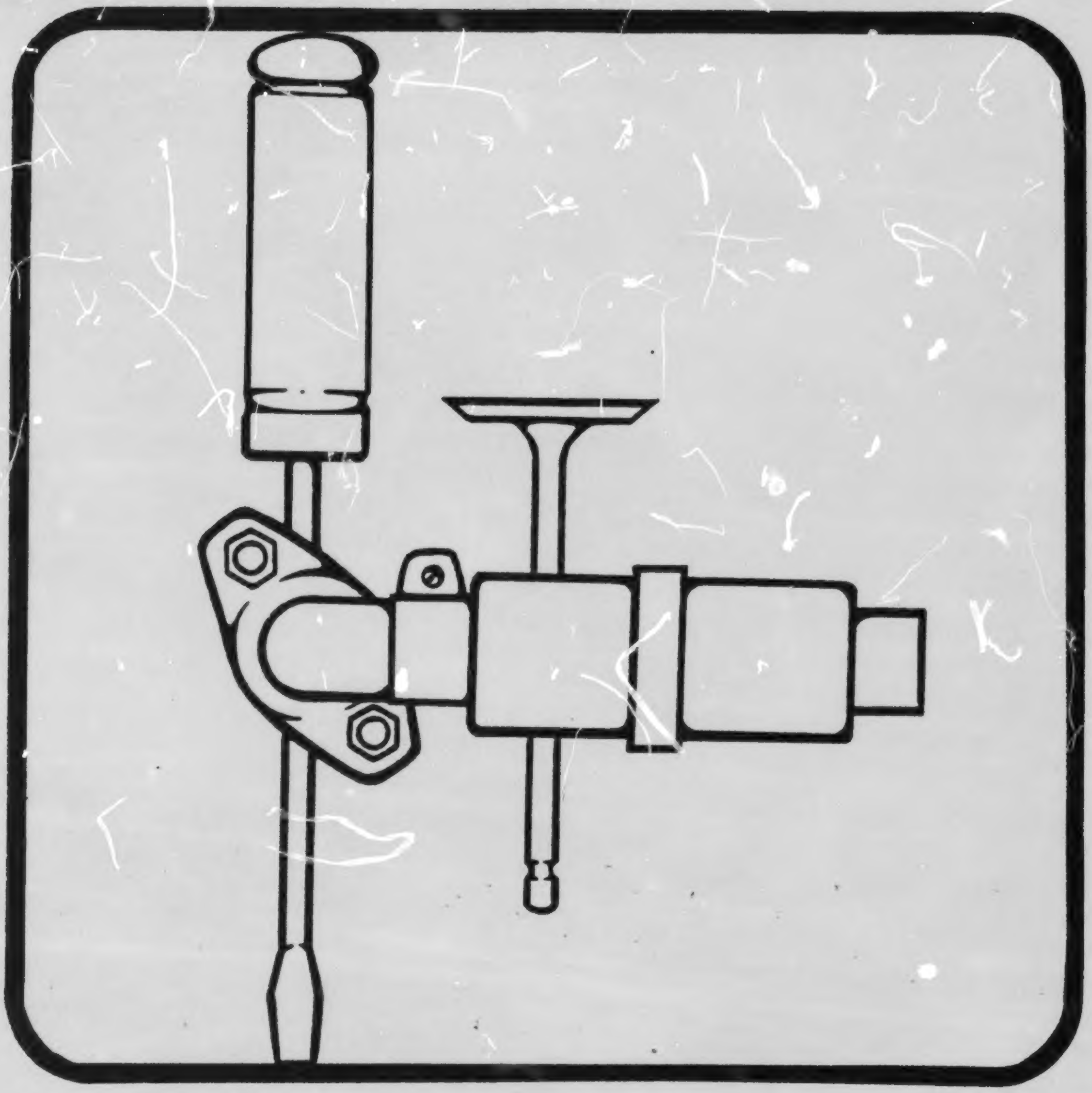


12. TELL YOUR INSTRUCTOR IF THE CONDENSER IS GOOD OR BAD.

13. SHOW YOUR INSTRUCTOR HOW TO TEST THE CONDENSER.

14. PUT AWAY YOUR EQUIPMENT.

CHECK: ASK YOUR INSTRUCTOR TO CHECK YOUR WORK.



small engine repair

unit: TEST EQUIPMENT

capital area career center

module: 7501 13 002 1
7501 13 002 3 **date:** JUNE 1977 **level:** I

skill title: COIL POWER TEST

developed & written by: HARRY WRIGHT

visuals by: DAVE WEHRWEIN AND BRUCE BENNETT

WORD GUIDE

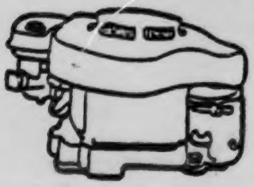
POWER OUTPUT - POWER GIVEN OUT BY A MACHINE

PERFORMANCE OBJECTIVE

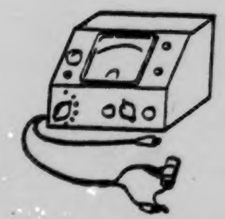
YOU ARE GOING TO LEARN:

1. HOW TO TEST A COIL WITH A MERCOTRONIC TESTER
2. HOW TO TEST FOR POWER OUTPUT WITH THE TESTER.
3. HOW TO CHECK AND SEE IF THE COIL MAKES STEADY SPARKS AT HIGH SPEED.

IN ORDER TO DO THIS YOU WILL NEED:



AN ENGINE WITH A COIL



A MERCOTRONIC TESTER

A MERCOTRONIC MANUAL

A PIECE OF CARDBOARD

WE WILL KNOW YOU CAN DO IT WHEN:

1. YOU HAVE ALL YOUR EQUIPMENT.
2. YOU HAVE CHECKED THE COIL FOR ITS RATED OUTPUT, ACCORDING TO MANUFACTURER'S GUIDELINES, AND FOR STEADY SPARKING.

WORD GUIDE

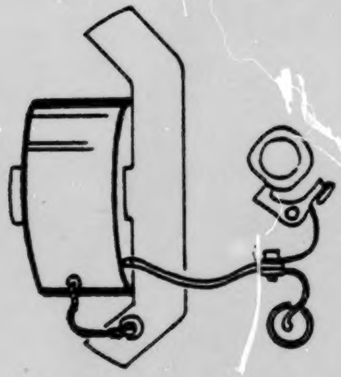
CORE - A SOFT IRON CENTER

WINDING - WIRE WRAPPED AROUND THE CORE

INSULATED - PROTECTED

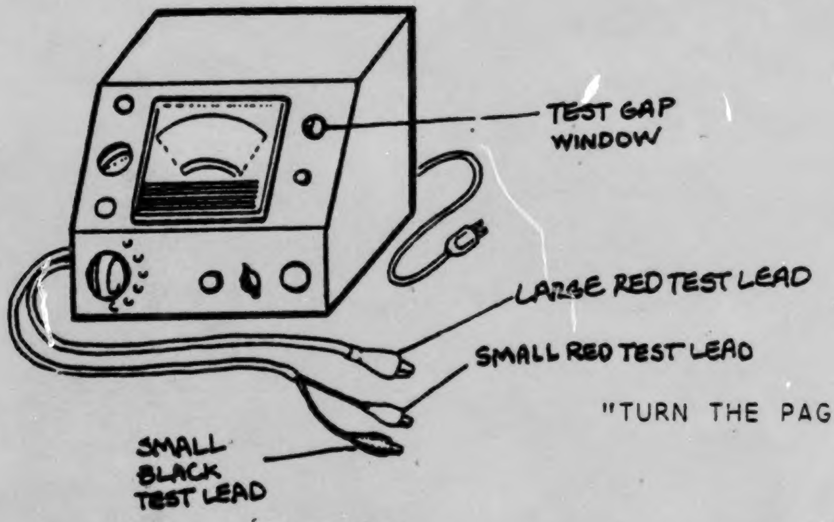
INFORMATION

A COIL USED ON A SMALL ENGINE WILL PROBABLY LOOK LIKE THIS:



THE COIL IS MADE OF A CORE AND TWO (2) WINDINGS. THE CORE IS MADE SO THE COIL CAN BE BOLTED TO THE ENGINE. ONE WINDING IN THE COIL IS CALLED "PRIMARY"; LOW CURRENT GOES INTO THIS WINDING. THE SECOND WINDING IS CALLED "SECONDARY"; HIGH CURRENT COMES FROM THE SECONDARY WINDING. THE WINDINGS ARE INSULATED WITH A TAR-LIKE MATERIAL.

THE MERCOTRONIC TESTER WILL LOOK SOMETHING LIKE THE PICTURE BELOW. THERE ARE MANY THINGS YOU NEED TO KNOW ABOUT THE TESTER BEFORE USING IT TO CHECK COIL POWER.


TEST GAP WINDOW
LARGE RED TEST LEAD
SMALL RED TEST LEAD
SMALL BLACK TEST LEAD

"TURN THE PAGE"

WORD GUIDE

VOLTAGE - ELECTRICAL POWER

VOLTS - A MEASURE OF ELECTRICITY

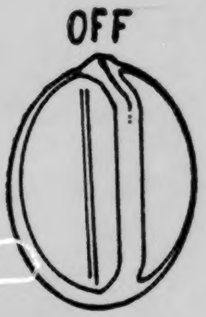
AMPERAGE - THE AMOUNT OF CURRENT FLOW

AMPS - SHORT FOR AMPERES

INFORMATION

1. TO CHECK VOLTAGES FROM 0 TO 24 VOLTS, USE THE SMALL RED (POSITIVE) AND BLACK (NEGATIVE) CLIPS.

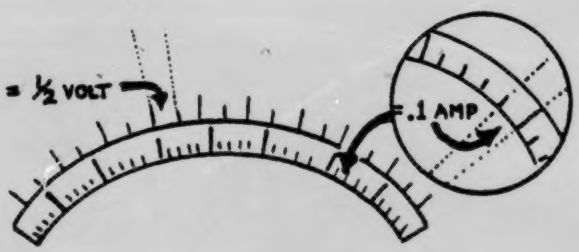
2. ALWAYS CHECK THE VOLTAGE ON AN ENGINE WITH THE SELECTOR SWITCH "OFF".



3. SCALE #1 HAS TWO SCALES ON IT:

   A. THE RED NUMBERS ARE FOR CHECKING VOLTAGE. EACH MARK IS 1/2 VOLT.

   B. THE BLACK SCALE IS FOR CHECKING AMPERAGE. THE SCALE WILL READ UP TO 4 AMPS. EACH LINE IS 1/10 OF AN AMP.



"TURN THE PAGE"

WORD GUIDE

MAGNETO - A DEVICE USED TO MAKE IGNITION SPARK

RATING - NUMBERS GIVEN IN THE MANUAL

LAMINATED - LAYERS OF METAL

INFORMATION

4. YOU DO NOT NEED TO TAKE THE MAGNETO FROM THE ENGINE TO MAKE THESE TESTS.

THE GUIDELINES IN THIS MOD ARE FOR THE 298654 COIL. IF YOU HAVE A DIFFERENT COIL, YOU WILL HAVE TO LOOK UP ITS GUIDELINES IN THE MERCOTRONIC MANUAL.

ALL COILS SHOULD START TO FIRE 1 TO 3 MARKS BEFORE THE RATING GIVEN IN THE GUIDELINES. IF THE COIL STARTS FIRING WITHIN THE RATING, IT IS NOT WORKING RIGHT AND SHOULD BE REPLACED.

WHEN TESTING COILS OFF A STATOR PLATE THE LAMINATED CORE MUST BE IN THE COIL.

IF YOU HAVE A COIL WITH 2 SECONDARY WINDINGS, REFER TO PAGE 23 IN THE MERCOTRONIC TESTING MANUAL.

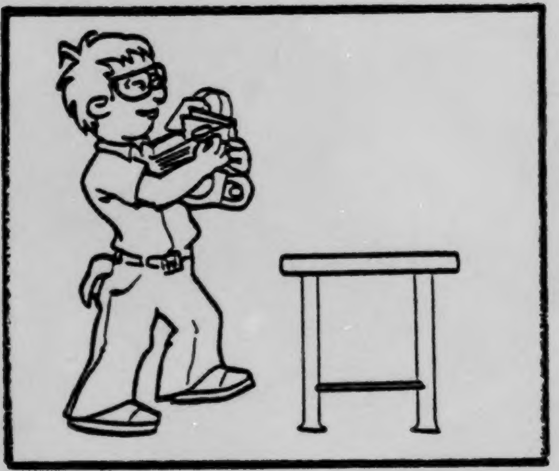
WORD GUIDE

DISCONNECT - REMOVE, TAKE OFF

JOB STEPS

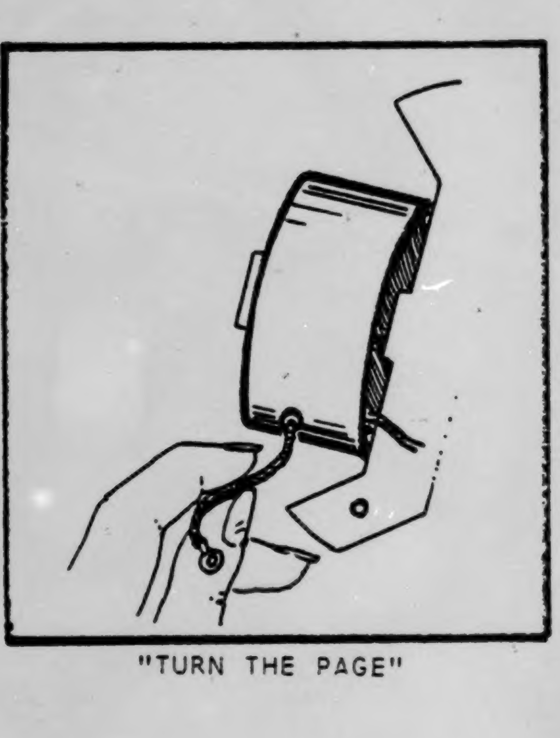
READ: LOOK:

1. GATHER ALL YOUR EQUIPMENT AND TAKE IT TO YOUR WORK AREA.



2. PLUG THE MERCOTRONIC TESTER INTO 115 VOLT OUTLET.

3. DISCONNECT THE PRIMARY GROUND WIRE AND PRIMARY LEAD WIRE.



"TURN THE PAGE"

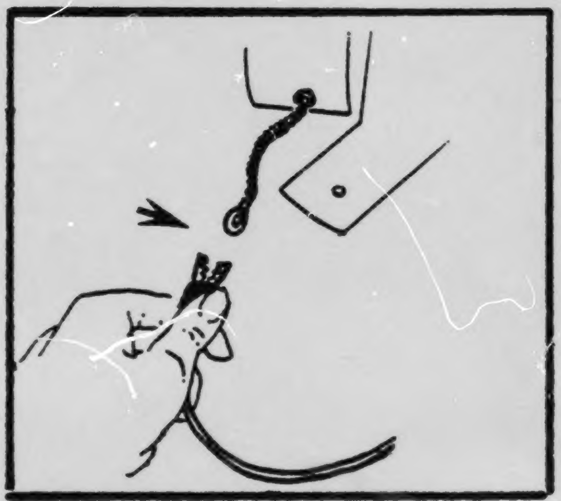
WORD GUIDE

TERMINAL - END THAT CONNECTS TO SOMETHING

JOB STEPS

READ: LOOK:

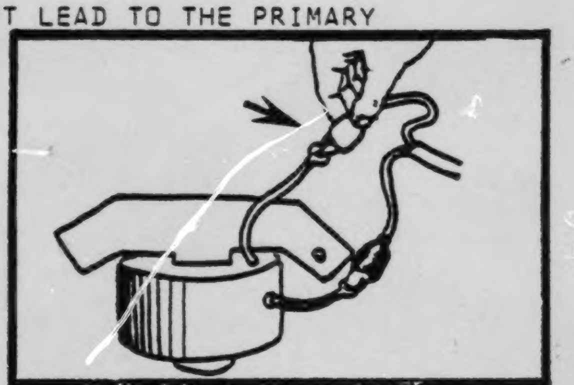
4. CLIP SMALL BLACK TEST LEAD TO COIL PRIMARY GROUND WIRE.



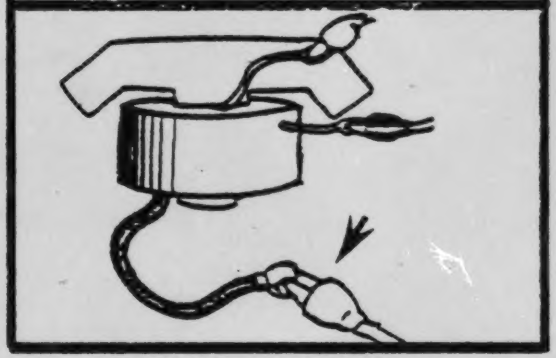
CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

1. ALL YOUR EQUIPMENT.
2. PLUGGED IN THE TESTER
3. DISCONNECTED THE COIL PRIMARY GROUND WIRE AND PRIMARY LEAD WIRE.
4. CLIPPED THE BLACK TEST LEAD TO THE PRIMARY GROUND WIRE.

5. CLIP SMALL RED TEST LEAD WIRE TO COIL PRIMARY LEAD WIRE.



6. CLIP LARGE RED TEST LEAD TO THE TERMINAL OF SPARK PLUG WIRE.



"TURN THE PAGE"

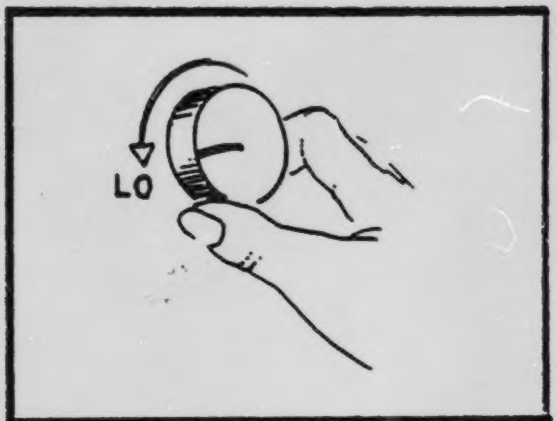
WORD GUIDE

CURRENT - ELECTRICITY

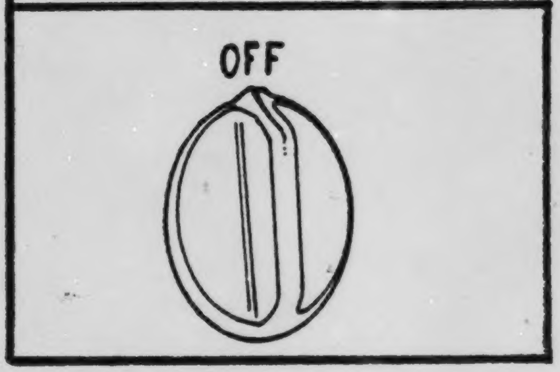
JOB STEPS

READ: LOOK:

7. BE SURE THE CURRENT CONTROL KNOB IS TO YOUR LEFT. THE POINTER ON THE KNOB WILL BE BEYOND "LOW".



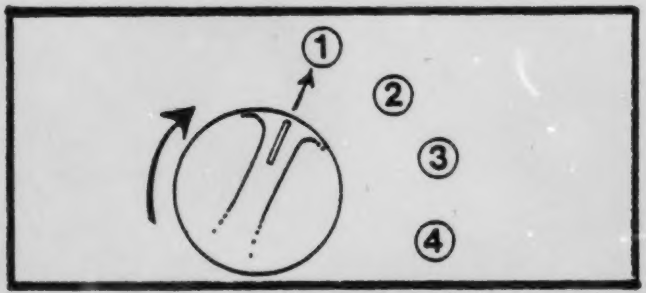
8. TURN VOLTS SCALE SWITCH TO "OFF".



CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

1. CLIPPED THE BLACK AND RED LEAD TEST WIRES IN THE RIGHT WAY.
2. CLIPPED THE LARGE RED TEST LEAD TO THE TERMINAL OF THE SPARK PLUG WIRE.
3. SET THE CURRENT CONTROL KNOB TO THE LEFT BEYOND "LOW".
4. TURNED THE VOLTS SCALE SWITCH TO "OFF".

9. TURN THE SELECTOR SWITCH TO #1 FOR THE "COIL POWER TEST".

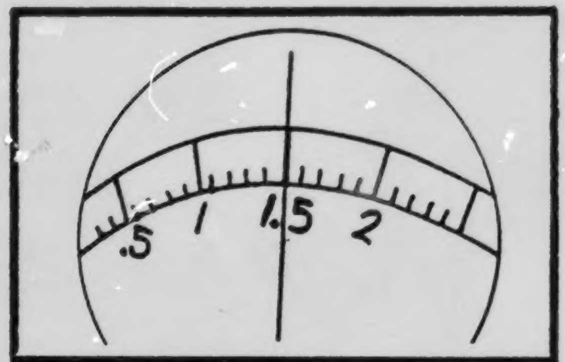


"TURN THE PAGE"

JOB STEPS

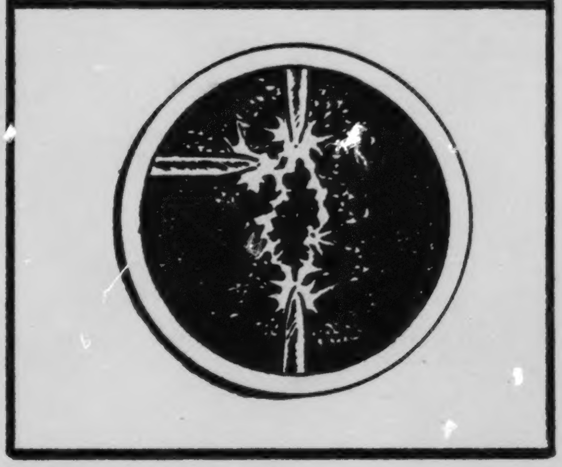
READ: LOOK:

10. TURN THE CURRENT CONTROL KNOB CLOCKWISE (RIGHT) UNTIL THE NEEDLE HITS THE MARK FOR 1.5 AMPS ON THE BLACK SCALE. →



11. WHEN THE NEEDLE HITS 1.5 AMPS, STOP TURNING THE CURRENT CONTROL KNOB. THE 5 MM SPARK GAP SHOULD MAKE A STEADY SPARK. →

NOTE: IF THERE IS NO SPARK, OR IF THE SPARK IS WEAK OR NOT STEADY, THE COIL IS NOT WORKING RIGHT AND MUST BE REPLACED. IF THERE IS A STEADY SPARK THE COIL IS GOOD.

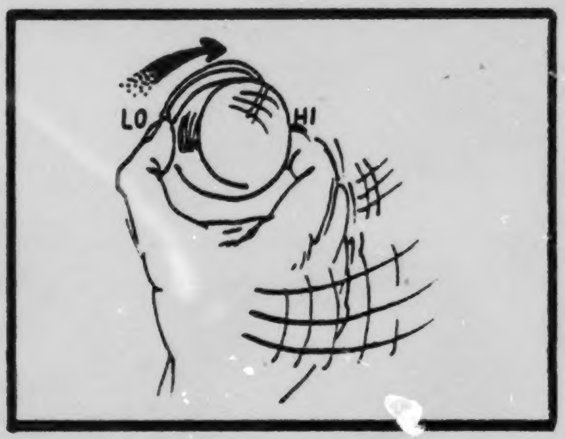


CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

1. TURNED THE SELECTOR SWITCH TO COIL POWER TEST POSITION.
2. SET THE 1.5 AMP READING ON THE BLACK SCALE.
3. HAVE A STEADY SPARK, OR DO NOT.

12. IF THE COIL IS GOOD, YOU CAN DO THE HIGH SPEED TEST. QUICKLY TURN THE CURRENT CONTROL KNOB CLOCKWISE (RIGHT) TO GET THE HIGHEST METER READING. →

NOTE: IF THERE IS NO SPARK OR IF THE SPARK IS NOT STEADY, THE COIL IS NO GOOD AND SHOULD BE REPLACED.



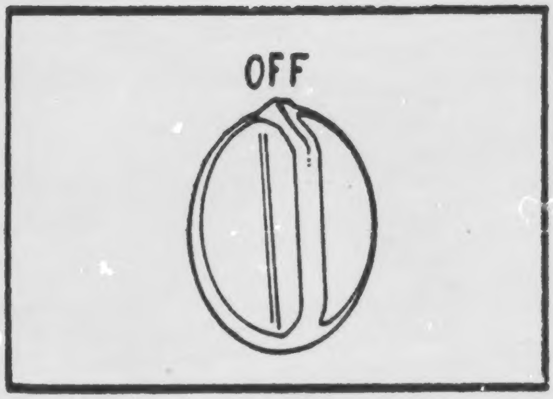
"TURN THE PAGE"

JOB STEPS

READD:

LOOK:

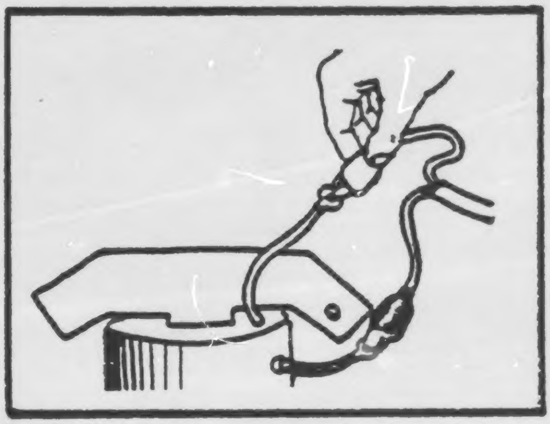
13. AS SOON AS YOU DO THIS TEST, TURN OFF THE SELECTOR SWITCH AND THE CURRENT CONTROL KNOB.



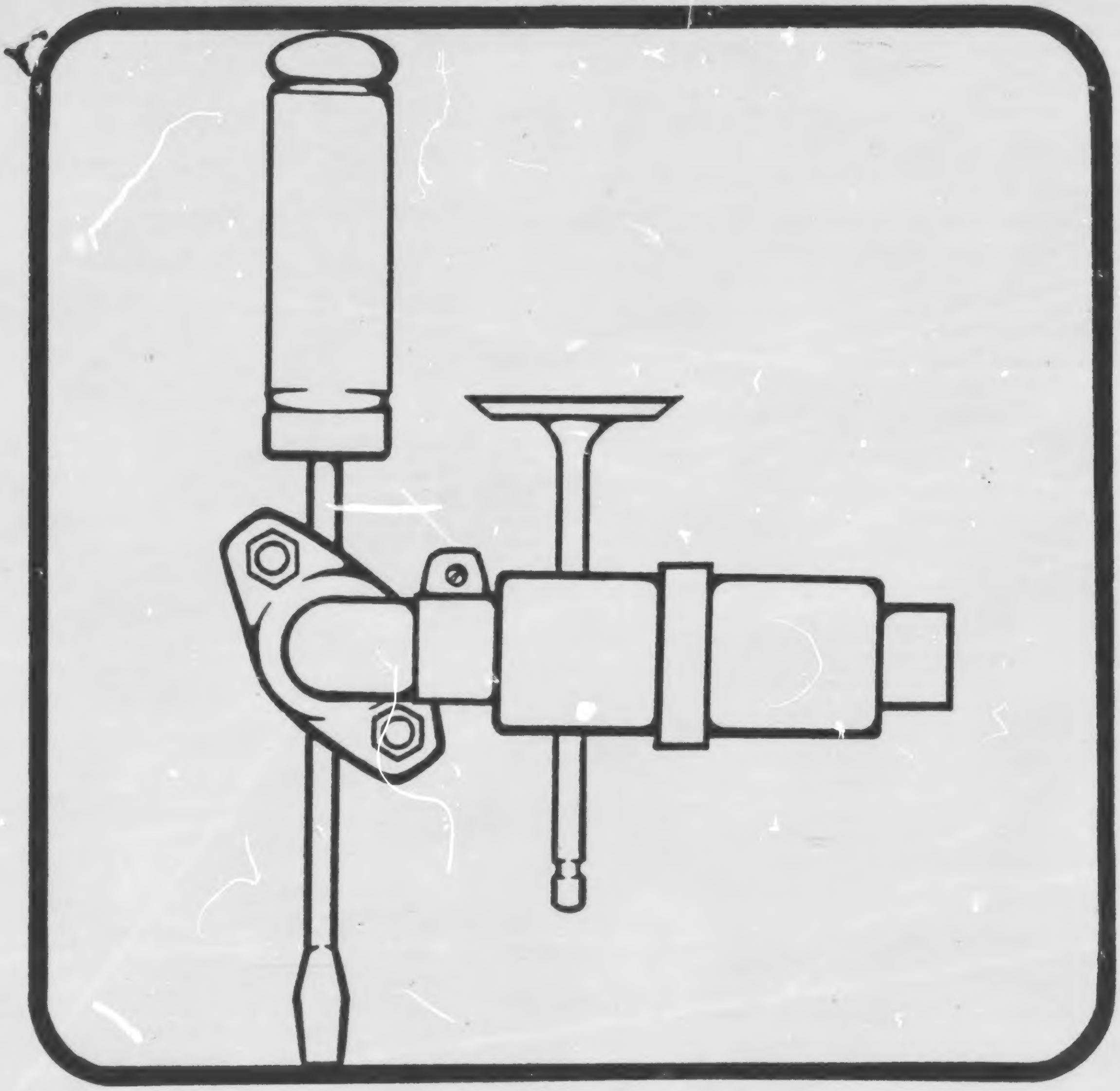
CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

1. ALL OF YOUR WORK DONE UP TO THIS POINT.
2. DONE THE HIGH SPEED TEST IN THE RIGHT WAY.
3. TURNED OFF THE SELECTOR SWITCH AND THE CURRENT CONTROL KNOB.

14. IF YOUR COIL PASSES, CONNECT ALL WIRES. IF NOT, REPLACE IT.



CHECK: HAVE YOUR INSTRUCTOR CHECK YOUR WORK.



small engine repair

unit: TEST EQUIPMENT

capital area career center

module: 7501 13 003 1
7501 13 003 3 date: MAY 1978 level: I

skill title: COIL SURFACE INSULATION TEST

developed & written by: JACK HELDER

visuals by: DAVE WEHRWEIN

WORD GUIDE

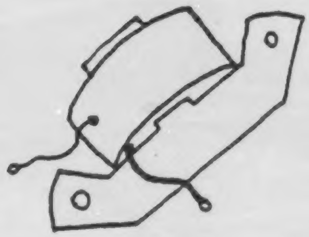
DEFECTS - PROBLEMS, LEAKS OR CRACKS

PERFORMANCE OBJECTIVE

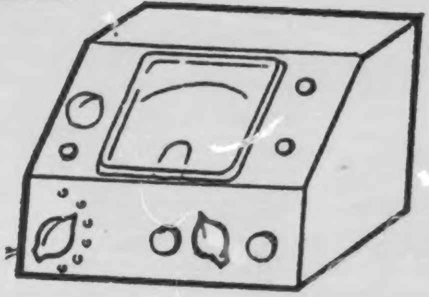
YOU ARE GOING TO LEARN:

HOW TO TEST A 298654 COIL FOR SURFACE INSULATION DEFECTS.

AND IN ORDER TO DO THIS YOU WILL NEED:



298654 COIL



MERCOTRONIC TESTER

WE WILL KNOW YOU CAN DO IT WHEN:

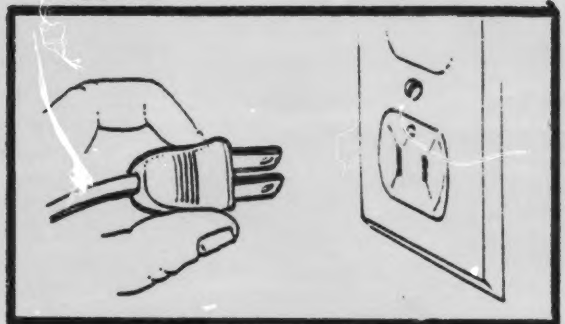
1. YOU HAVE GATHERED THE RIGHT EQUIPMENT.
2. YOU HAVE TESTED A 298654 COIL.
3. YOU CAN TELL YOUR INSTRUCTOR IF THE COIL HAS DEFECTS OR IS GOOD.

"TURN THE PAGE"

JOB STEPS

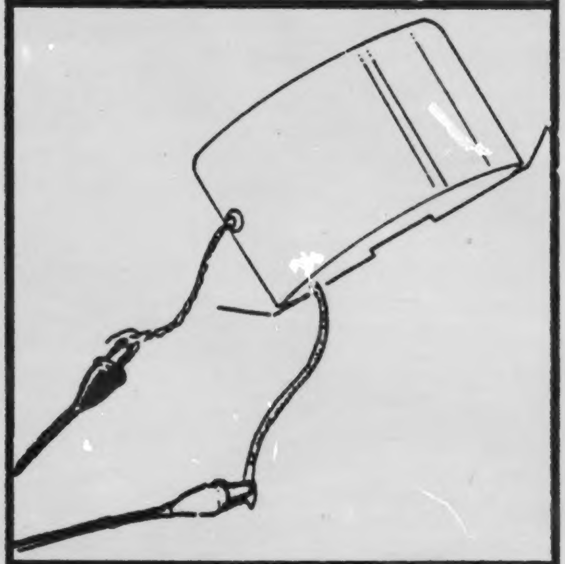
READ: LOOK:

1. PLUG IN THE MERCOTRONIC TESTER TO A 115 VOLT OUTLET. →

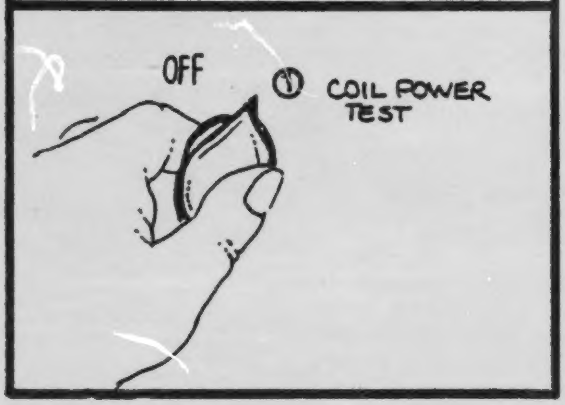


2. CLIP THE SMALL RED TEST LEAD TO THE COIL PRIMARY LEAD. →

3. CLIP THE BLACK TEST LEAD TO THE COIL PRIMARY GROUND WIRE. →



4. TURN THE SELECTOR SWITCH TO NUMBER 1, COIL POWER TEST. →



CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

1. PLUGGED IN THE TESTER.
2. CLIPPED THE RED TEST LEAD TO THE COIL PRIMARY LEAD.
3. CLIPPED THE BLACK TEST LEAD TO THE COIL PRIMARY GROUND WIRE.
4. TURNED THE SELECTOR SWITCH TO COIL POWER TEST.

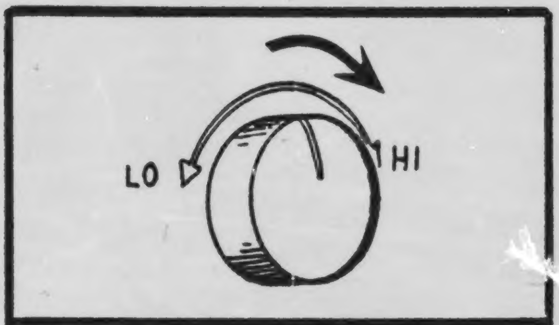
"TURN THE PAGE"

JOB STEPS

READ: LOOK:

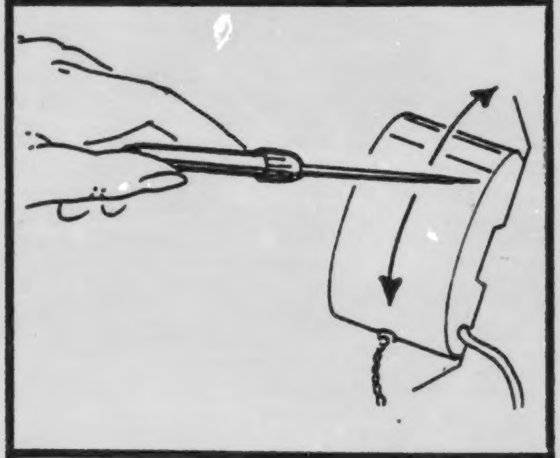
5. TURN THE CURRENT CONTROL KNOB TO "HIGH" AND FIND THE HIGHEST CURRENT READING.

NOTE: IF CURRENT READS OFF THE SCALE, LOWER THE CURRENT CONTROL KNOB UNTIL CURRENT READS WITHIN SCALE.

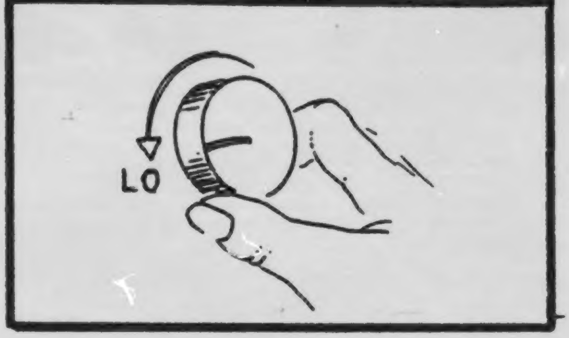


6. PASS THE END OF THE INSULATION TEST PROBE OVER THE INSULATED SURFACE OF THE COIL AND SPARK PLUG WIRE. DO NOT HOLD IT IN ONE PLACE TOO LONG.

NOTE: IF YOU SEE A SPARK, THE INSULATION IS CRACKED.



7. TURN THE CURRENT CONTROL KNOB TO "LO".



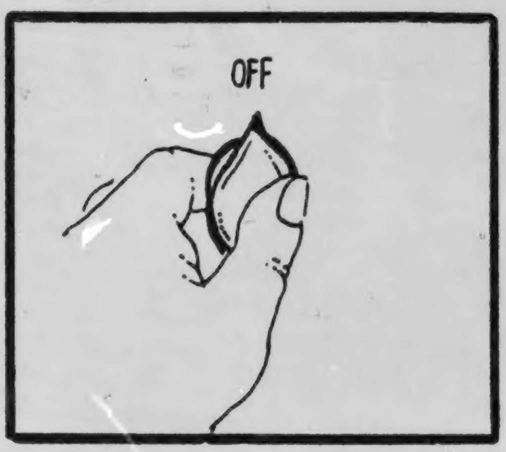
CHECK: SHOW YOUR INSTRUCTOR HOW TO RUN THE TEST FOR COIL SURFACE INSULATION (STEPS 5 AND 6).

"TURN THE PAGE"

JOB STEPS

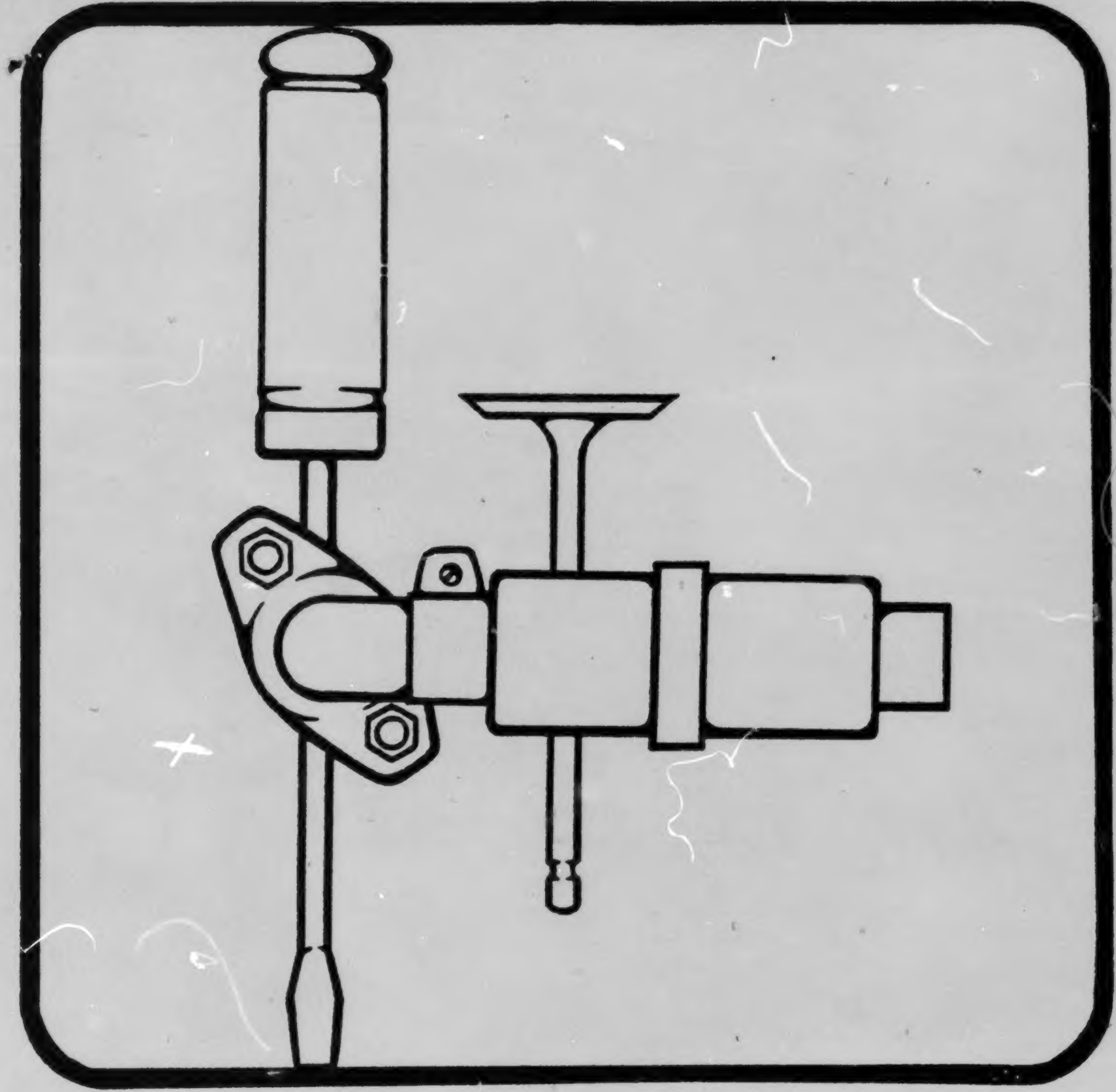
READ: LOOK:

8. TURN THE SELECTOR SWITCH TO "OFF".



9. PUT AWAY YOUR EQUIPMENT.

CHECK: HAVE YOUR INSTRUCTOR CHECK YOUR WORK.



small engine repair

unit: TEST EQUIPMENT

capital area career center

module: 7501 13 005 1
7501 13 005 3 date: MAY 1978 level: I

skill title: DYNAMOMETER - MARK II

developed & written by: JACK HELDER

visuals by:

PERFORMANCE OBJECTIVE

YOU ARE GOING TO LEARN:

HOW TO TEST A SNOWMOBILE ON THE MARK II DYNAMOMETER.

AND IN ORDER TO DO THIS YOU WILL NEED:

SNOWMOBILE THAT RUNS

A DYNAMOMETER

HAND TOOLS

WE WILL KNOW YOU CAN DO IT WHEN:

1. YOU HAVE GATHERED YOUR EQUIPMENT.
2. YOU HAVE TESTED THE SNOWMOBILE AND ADJUSTED THE CARBURETOR SO THAT IT RUNS AS DESCRIBED IN THIS MODULE.

"TURN THE PAGE"

JOB STEPS

READ:	LOOK:
1. CHECK THE OIL AND GAS LEVELS IN THE SNOWMOBILE YOU WILL BE TESTING.	
2. CHECK THE OIL LEVEL IN THE DYNAMOMETER BY TAKING THE OIL CAP OFF TO SEE IF THE OIL TANK IS FULL.	
3. BE SURE PRESSURE CONTROL KNOB IS SET NEAR "O".	
4. WITH SOMEONE TO HELP YOU, PUT THE SNOWMOBILE ON THE DYNAMOMETER.	

"TURN THE PAGE"

JOB STEPS

READ: LOOK:

5. REMOVE THE ENGINE SHROUD SO YOU CAN REACH THE CARBURETOR ADJUSTMENTS.

6. ATTACH THE RETAINING BAR AND THE TIE DOWN CHAIN TO THE TOW BAR AT THE REAR OF THE SNOWMOBILE.

7. ALSO TIE DOWN THE SNOWMOBILE WITH CHAINS.

CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

1. CHECKED SNOWMOBILE OIL AND GAS LEVELS.
2. CHECKED OIL LEVEL IN THE DYNAMOMETER.
3. PUT THE SNOWMOBILE ON THE DYNAMOMETER.
4. CHECKED THAT THE PRESSURE IS NEAR "0".
5. REMOVED THE ENGINE SHROUD.
6. CHAINED THE SNOWMOBILE DOWN.

"TURN THE PAGE"

JOB STEPS

READ: LOOK:

8. START THE SNOWMOBILE ENGINE AND SLOWLY SPEED IT UP WHILE SITTING ON THE MACHINE.

9. BE SURE THE TRACK IS NOT TOUCHING ANY PARTS OF THE DYNAMOMETER BESIDES THE ROLLER TRACK. CHECK ALL AROUND.

CHECK: HAVE YOUR INSTRUCTOR CHECK YOUR WORK.

10. SPEED UP TO FULL SPEED.

"TURN THE PAGE"

JOB STEPS

READ: LOOK:

11. TURN PRESSURE CONTROL KNOB ON DYNAMOMETER UNTIL IT READS 250 LBS.

12. ADJUST THE HIGH SPEED NEEDLE ON THE SNOWMOBILE CARBURETOR.

NOTE: WATCH THE SPEEDOMETER. TURN THE NEEDLE UNTIL MACHINE REACHES THE HIGHEST SPEED. THE SPEED SHOULD STAY STEADY.

13. TURN THE DYNAMOMETER PRESSURE CONTROL KNOB TO 500 POUNDS PRESSURE. WATCH THE SPEEDOMETER. SPEED SHOULD STAY STEADY.

14. SHUT OFF THE DYNAMOMETER PRESSURE CONTROL AND SLOW THE SNOWMOBILE TO IDLE.

CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:
1. ADJUSTED THE CARBURETOR SO THAT SNOWMOBILE RUNS STEADY AT HIGH SPEED AT 250 POUNDS PRESSURE.
2. CHECKED THAT THE SNOWMOBILE ALSO RUNS STEADY AT 500 POUNDS PRESSURE.

"TURN THE PAGE"

JOB STEPS

READ: LOOK:

15. SHUT OFF THE SNOWMOBILE.

16. REMOVE THE TIE DOWN CHAINS AND RETAINING BAR.

17. HAVE SOMEONE HELP YOU TAKE THE SNOWMOBILE OFF THE DYNAMOMETER.

18. CLEAN UP THE SNOWMOBILE AND REPLACE THE SHROUD.

CHECK: HAVE YOUR INSTRUCTOR CHECK YOUR WORK.

small engine repair

unit: TEST EQUIPMENT

capital area career center

module: 7501 13 006 1
7501 13 006 3 **date:** 6/77 **level:** I

skill title: CONDENSER LEAK AND SHORTAGE TEST

developed & written by: HARRY WRIGHT

visuals by: DAVE WEHRWEIN

WORD GUIDE

CONDENSER - STORES ELECTRICITY.

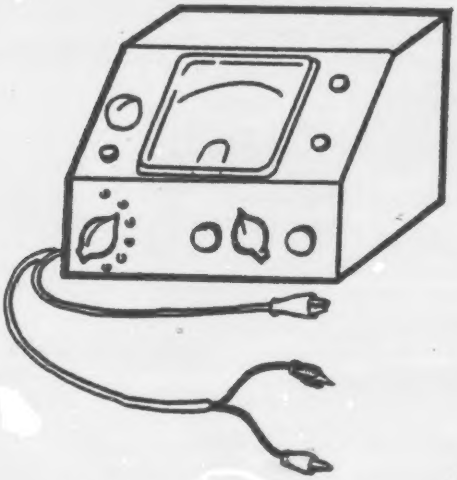
SHORTS - TWO HOT WIRES TOUCHING.

PERFORMANCE OBJECTIVE

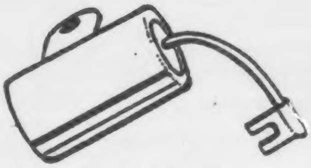
YOU ARE GOING TO LEARN:

HOW TO USE THE MERCOTRONIC TESTER TO CHECK A CONDENSER FOR LEAKS AND SHORTS.

AND IN ORDER TO DO THIS YOU WILL NEED:



MERCOTRONIC TESTER



CONDENSER

THE CORRECT MANUAL

WE WILL KNOW YOU CAN DO THIS WHEN:

1. YOU HAVE GATHERED YOUR EQUIPMENT.
2. YOU HAVE LEARNED HOW TO OPERATE THE TESTER.
3. YOU HAVE CHECKED THE CONDENSER FOR LEAKS OR SHORTS (ACCORDING TO SERVICE SPECIFICATIONS).

"TURN THE PAGE"

WORD GUIDE

POINTS - IGNITION POINTS.

MAGNETO - A DEVICE USED TO MAKE SPARK.

TERMINAL - A PART THAT FORMS THE END.

INSULATED - PREVENTED FROM TRANSFERRING ELECTRICITY.

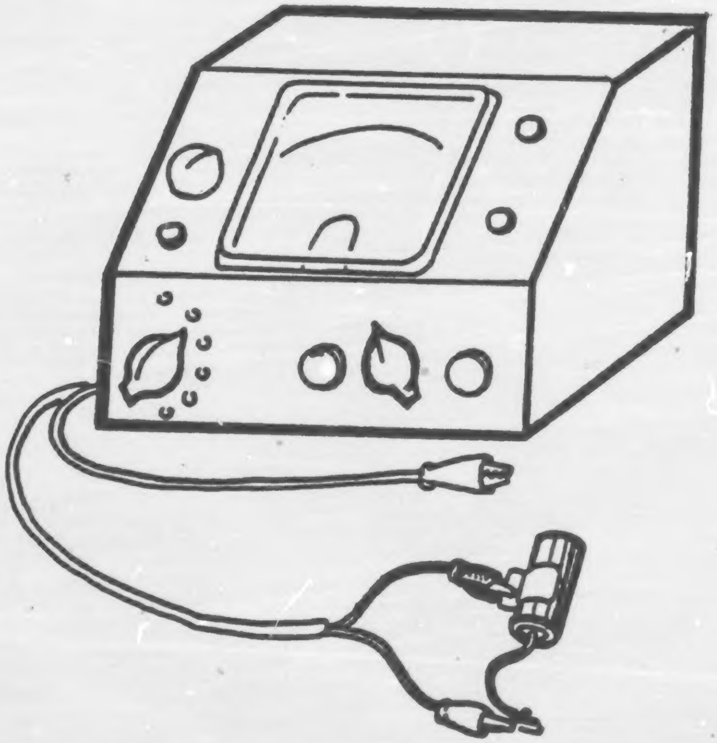
INFORMATION

YOU ARE GOING TO TEST (OR CHECK) A CONDENSER FOR ELECTRIC LEAKS OR SHORTS.

IF THERE IS A LEAK OR A SHORT, THE CONDENSER WILL NOT WORK PROPERLY. THE POINTS WILL BURN UP. THIS WILL CAUSE THE ENGINE TO QUIT RUNNING.

FOR THIS TEST, YOU CAN HAVE THE CONDENSER EITHER ON OR OFF THE MAGNETO. IF THE CONDENSER IS ON THE MAGNETO, REMOVE THE CONDENSER LEAD FROM THE BREAKER POINT TERMINAL. IF THE CONDENSER IS OFF THE MAGNETO, DON'T TEST ON A METAL SURFACE: KEEP LEAD CLIPS OFF ANY OTHER METAL.

THE TESTER IS CONNECTED TO THE CONDENSER AS SHOWN IN THE PICTURE BELOW.



"TURN THE PAGE"

WORD GUIDE

STATOR PLATE - THE PLATE THAT THE COIL, POINTS AND CONDENSER MOUNT TO.

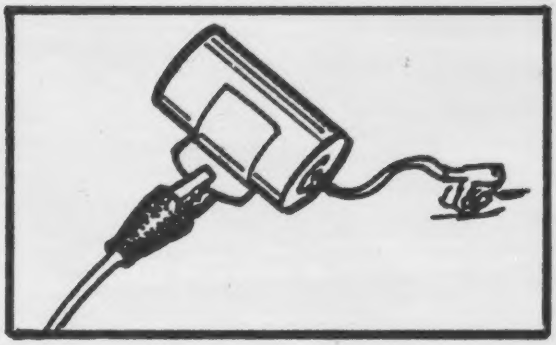
BREAKER TERMINAL - THE PLACE WHERE THE WIRES ATTACH TO THE POINT.

JOB STEPS

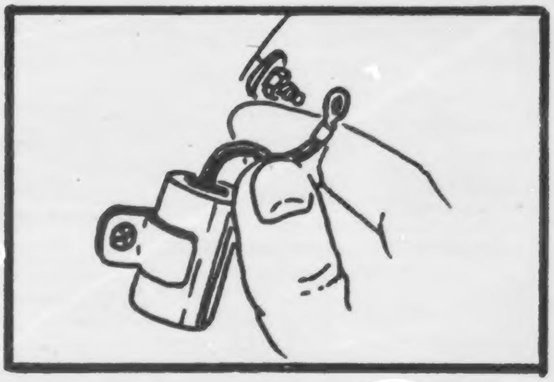
READ: LOOK:

1. GATHER ALL YOUR EQUIPMENT AND MATERIALS. TAKE THEM TO YOUR WORK AREA.

2. CLIP THE SMALL BLACK TEST LEAD TO THE STATOR PLATE, CONDENSER BODY OR MOUNTING BRACKET.



3. REMOVE THE CONDENSER LEAD WIRE FROM THE BREAKER TERMINAL.

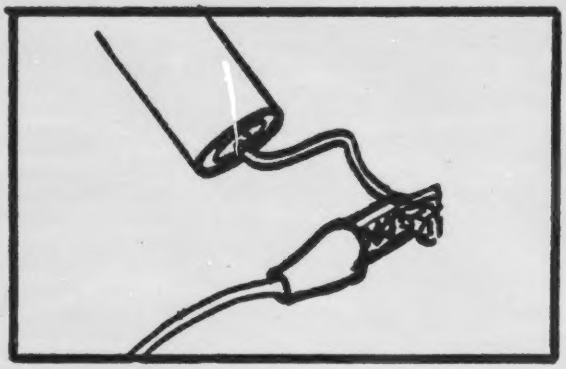


"TURN THE PAGE"

JOB STEPS

READ: LOOK:

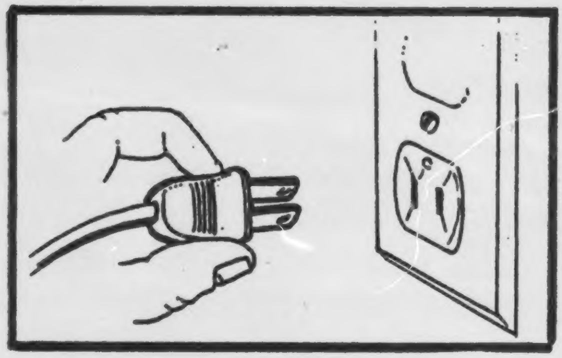
4. CLIP THE SMALL RED TEST LEAD TO CONDENSER LEAD WIRE. →



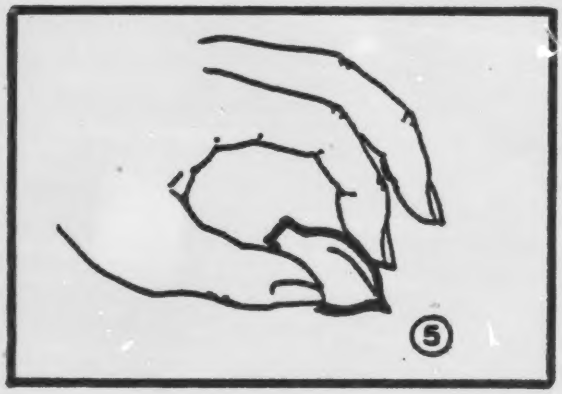
CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

1. CLIPPED THE TEST LEAD TO THE CONDENSER LEAD.
2. CLIPPED THE BLACK TEST LEAD TO THE CONDENSER OR STATOR PLATE.

5. PLUG THE TESTER INTO A 115 VOLT ELECTRICAL OUTLET. →



6. TURN THE SELECTOR SWITCH TO #5 "LEAKAGE" ADN SHORT POSITION. →



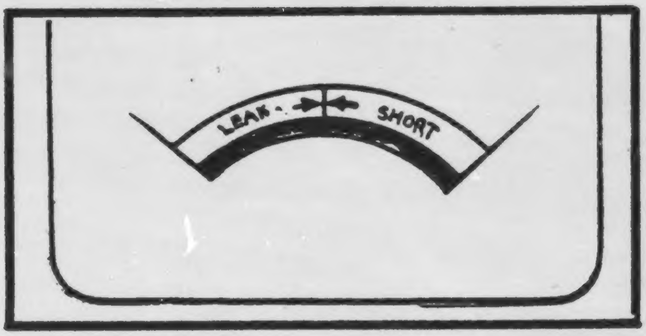
"TURN THE PAGE"

JOB STEPS

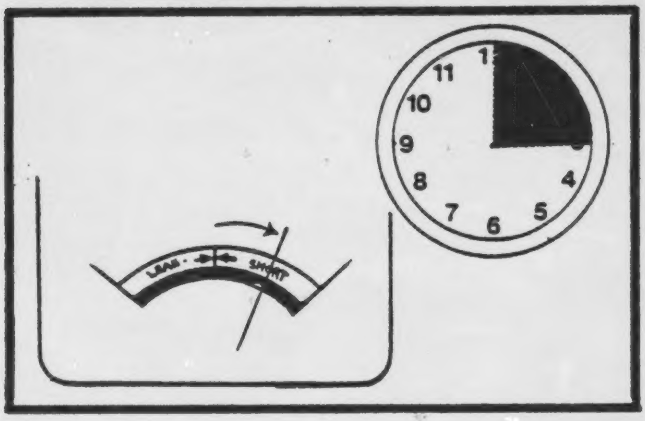
READ:

LOOK:

7. LOOK AT SCALE #5.

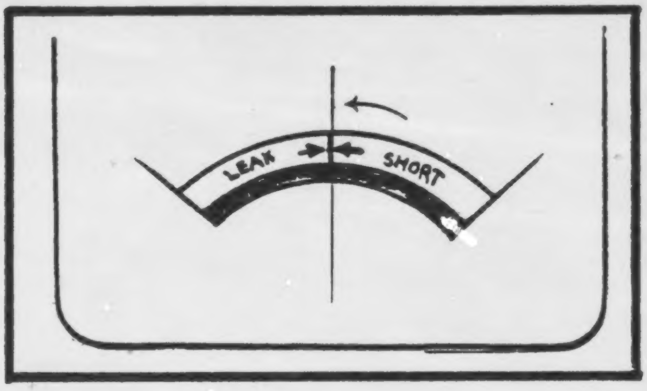


8. PUSH DOWN THE RED BUTTON AND HOLD IT DOWN AT LEAST 15 SECONDS. THE POINTERS SHOULD MOVE TO THE RIGHT, THEN BACK TO THE "O" LINE WITHIN 15 SECONDS.


LEAK
SHORT
11
10
9
8
7
6
5
4

9. LET GO OF THE BUTTON. THE METER POINTER SHOULD MOVE BACK TO THE "O" LINE.

NOTE: IF THE POINTER STAYS TO THE RIGHT OF THE "O" LINE, IT MEANS THE CONDENSER MUST BE REPLACED.



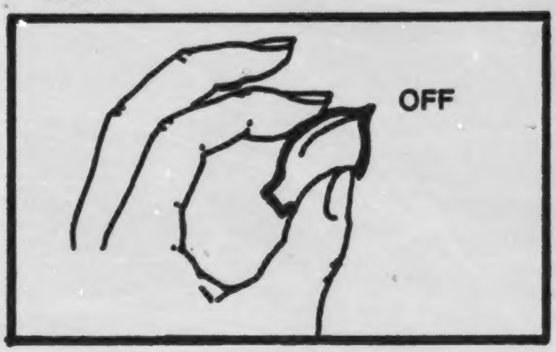
"TURN THE PAGE"

JOB STEPS

READ:

10. TURN THE TEST SELECTOR TO "OFF".

LOOK:



CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

1. PLUGGED TESTER INTO 115 VOLT ELECTRICAL OUTLET.
2. TURNED SELECTOR SWITCH TO #5 "LEAKAGE" AND SHORT POSITION.
3. LOOKED AT SCALE #5, PUSHED DOWN THE RED BUTTON AND HELD IT FOR AT LEAST 15 SECONDS.
4. TESTED THE CONDENSER AND KNEW IF IT WAS GOOD.
5. TURNED "OFF" THE TESTER.

small engine repair

unit: TEST EQUIPMENT

capital area career center

module: 7501 13 007 1
7501 13 007 3 date: 9/77 level:

skill title: CONDENSER SERIES RESISTANCE TEST

developed & written by: D. CONSTANTINI

visuals by: DAVE WEHRWEIN

WORD GUIDE

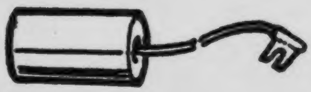
MERCOTRONIC TESTER - TESTS FOR ELECTRICITY IN ELECTRICAL ENGINE PARTS

PERFORMANCE OBJECTIVE

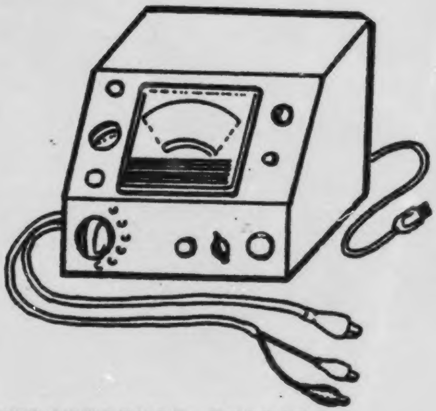
YOU ARE GOING TO LEARN:

HOW TO TEST A CONDENSER FOR A SERIES RESISTANCE, USING A MERCOTRONIC TESTER.

AND IN ORDER TO DO THIS YOU WILL NEED:



CONDENSER



MERCOTRONIC TESTER

WE WILL KNOW YOU CAN DO IT WHEN:

1. YOU HAVE ALL YOUR EQUIPMENT.
2. YOU HAVE TESTED A CONDENSER WITH A MERCOTRONIC TESTER TO SEE IF IT HAS SERIES RESISTANCE.

"TURN THE PAGE"

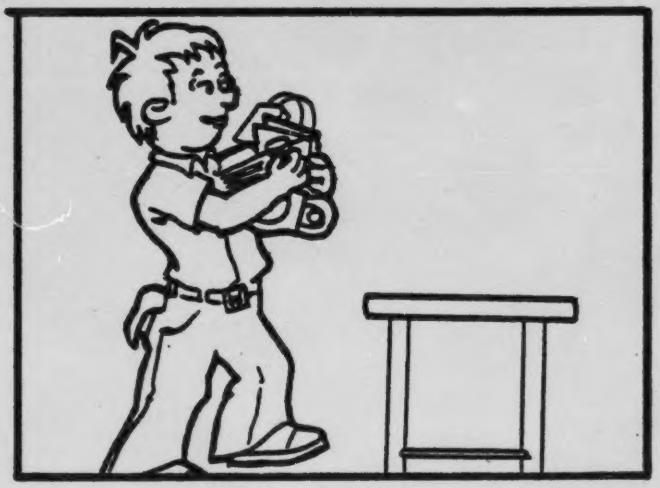
WORD GUIDE

MAGNETO - A PART WHICH FIRES A SPARK PLUG AND NEEDS NO BATTERY TO WORK.

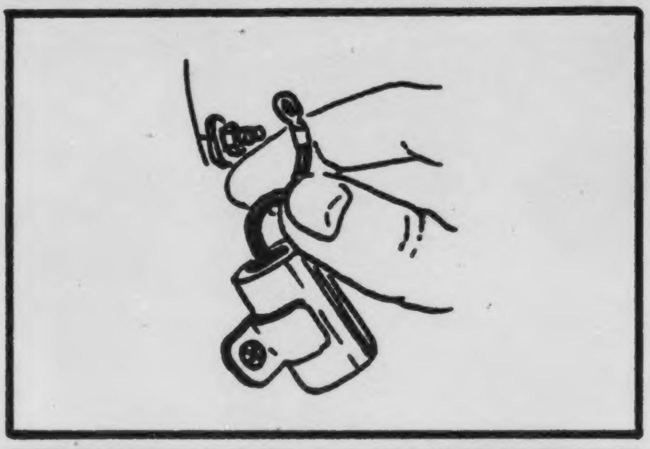
JOB STEPS

READ: LOOK:

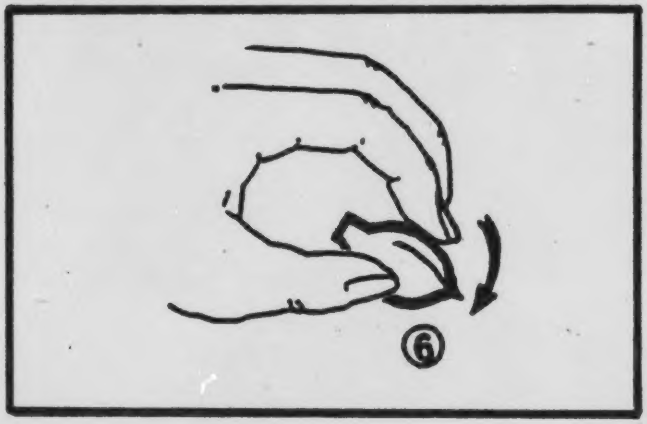
1. GET ALL EQUIPMENT AND TAKE IT TO YOUR WORK AREA.



2. REMOVE THE CONDENSER LEAD FROM THE BREAKER TERMINAL.



3. TURN THE SELECTOR SWITCH TO #6, "CONDENSER SERIES RESISTANCE".



"TURN THE PAGE"

WORD GUIDE

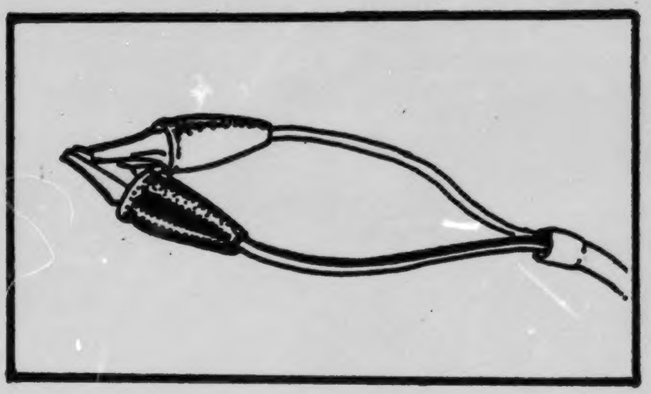
OUTLET - SOCKET

JOB STEPS

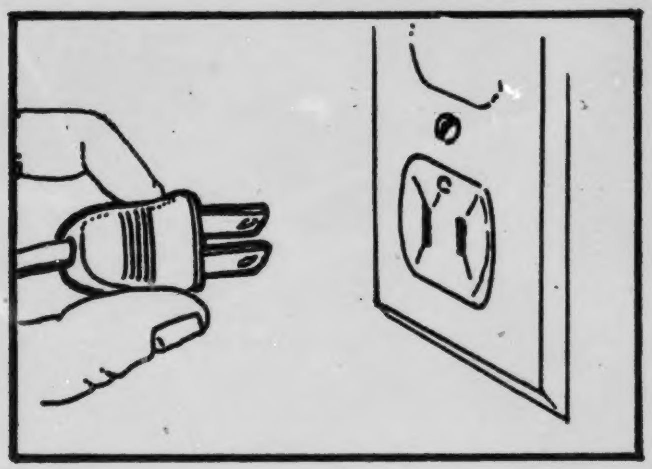
READ:

LOOK:

4. TO SET THE METER, CLIP THE SMALL BLACK TEST LEAD TO THE RED TEST LEAD.



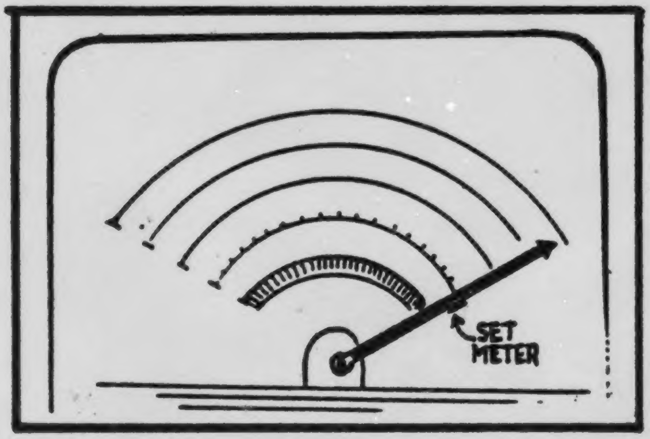
5. PLUG TESTER INTO A 115V OUTLET.



CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

1. ALL EQUIPMENT.
2. LIFTED THE CARDBOARD BETWEEN BREAKER POINTS, IF NEEDED.
3. TURNED THE SWITCH TO #6.
4. CLIPPED THE LEADS TOGETHER.
5. PLUGGED IN THE TESTER.

6. MOVE THE METER SET SCALE TO "6" SO THAT THE NEEDLE IS ALL THE WAY TO THE RIGHT SIDE OF THE SCALE.

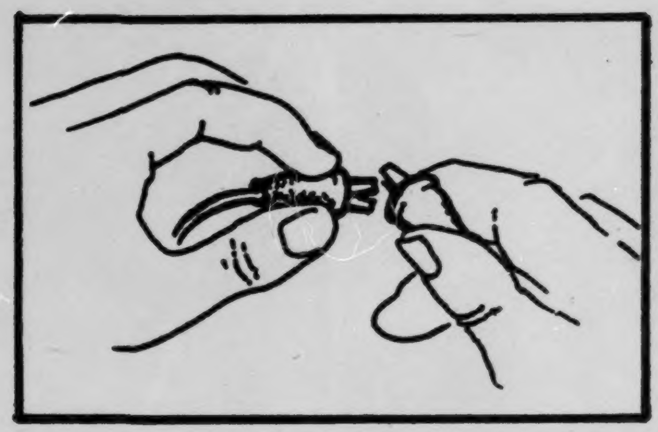


"TURN THE PAGE"

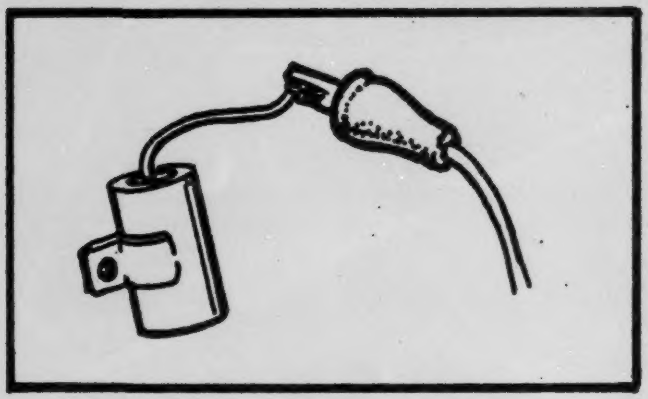
JOB STEPS

READ: **LOOK:**

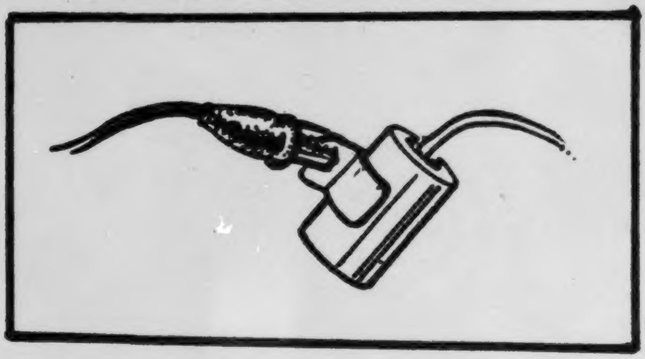
7. UNCLIP THE TEST LEADS.



8. CLIP THE SMALL, RED TEST LEAD TO THE LOOSE CONDENSER LEAD.



9. CLIP THE SMALL, BLACK TEST LEAD TO THE STATOR PLATE OR BODY OF THE CONDENSER.



CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

1. SET THE METER SET SCALE TO 6.
2. UNCLIPPED THE TEST LEADS.
3. CLIPPED THE SMALL, RED TEST LEAD TO THE BREAKER TERMINAL OR LOOSE CONDENSER LEAD.
4. CLIPPED THE SMALL, BLACK TEST LEAD TO STATOR PLATE OR CONDENSER BODY.

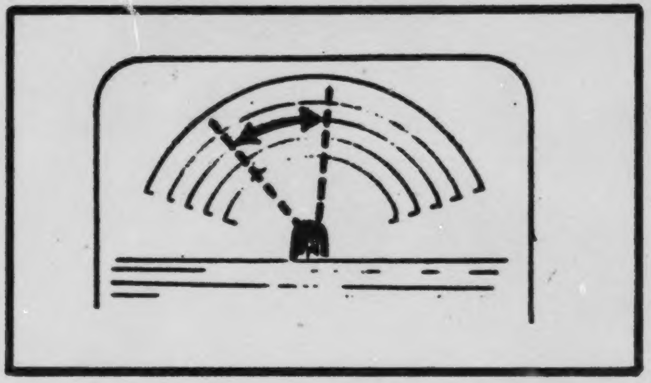
"TURN THE PAGE"

WORD GUIDE 6

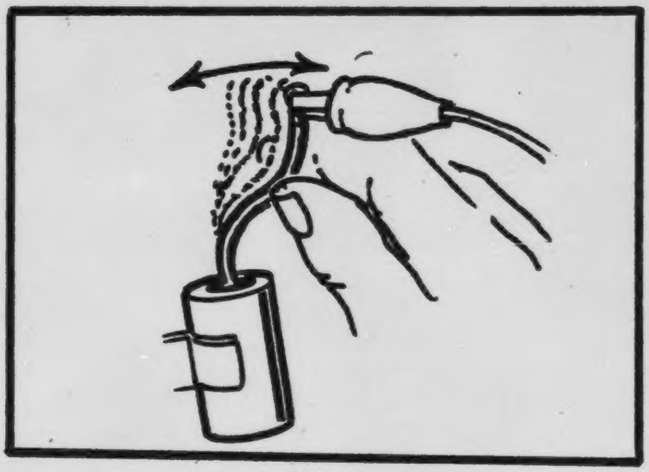
JOB STEPS **WRIGGLE** - TWIST LIGHTLY

READ: **LOOK:**

10. CHECK TO SEE IF THE METER POINTER IS WITHIN THE GREEN BLOCK ON SCALE #6. HAVE YOUR INSTRUCTOR CHECK THIS.



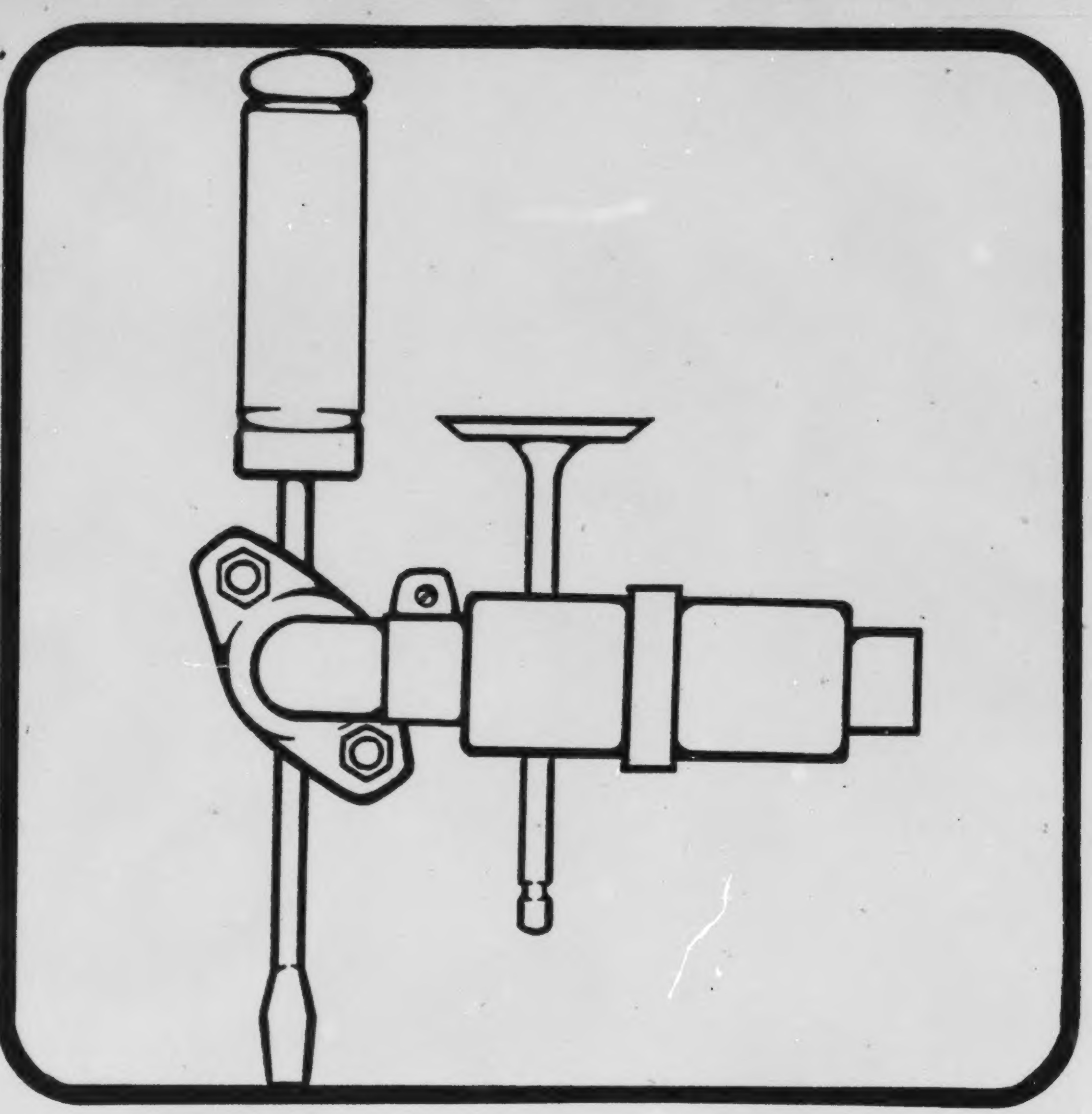
11. WHEN YOU TEST, WRIGGLE THE LEAD COMING OUT OF THE CONDENSER. LOOK TO SEE IF THE METER NEEDLE MOVES:
    - A. IF THE NEEDLE METER MOVES, THE CONDENSER LEAD IS "OPEN".
    - B. IF THE NEEDLE STAYS WITHIN THE GREEN ZONE ON THE SCALE, THE CONDENSER IS ALL RIGHT.
    - C. IF THE NEEDLE MOVES TO THE RED ZONE ON THE SCALE, THE CONDENSER IS NOT WORKING RIGHT.



CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

1. CHECKED THE METER POINTER TO SEE WHAT ZONE IT IS IN.
2. CHECKED IF THE METER NEEDLE MOVED WHEN YOU WRIGGLED THE CONDENSER LEAD.
3. FOUND WHETHER THE CONDENSER IS OK OR NOT.

12. WITH YOUR INSTRUCTOR THERE, TURN THE TEST SELECTOR "OFF".



small engine repair

unit: TEST EQUIPMENT

capital area career center

7501 13 008 1
module: 7501 13 008 3 **date:** JUNE 1977 **level:** I

skill title: PRIMARY RESISTANCE TEST

developed & written by: HARRY WRIGHT

visuals by: DAVE WEHRWEIN

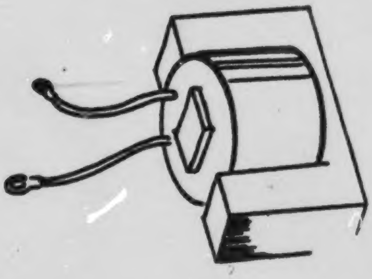
RESISTANCE - AN OPPOSING FORCE SLOWS DOWN OR STOPS THE FLOW OF ELECTRICITY.

PERFORMANCE OBJECTIVE

YOU ARE GOING TO LEARN:

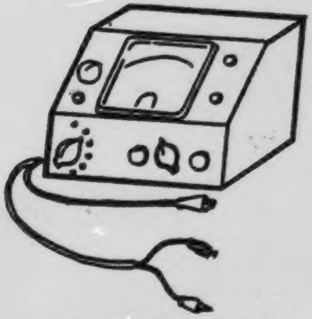
- HOW TO MEASURE RESISTANCE IN THE COIL USING A MERCOTRONIC TESTER.

AND IN ORDER TO DO THIS YOU WILL NEED:



A COIL

A MERCOTRONIC TESTER MANUAL



A MERCOTRONIC TESTER

WE WILL KNOW YOU CAN DO IT WHEN:

1. YOU HAVE CORRECTLY GATHERED ALL OF YOUR EQUIPMENT.
2. YOU KNOW HOW TO USE THE MERCOTRONIC TESTER.
3. YOU HAVE TESTED THE COIL FOR RESISTANCE, USING THE MERCOTRONIC TESTER, TO THE MANUAL'S SPECIFICATIONS.

"TURN THE PAGE"

WORD GUIDE

PRIMARY - LARGE WIRE WINDING IN A COIL.

CIRCUIT - COMPLETE PATH OF AN ELECTRIC CURRENT.

SPECIFIED - CERTAIN, STATED.

MAXIMUM - THE MOST.

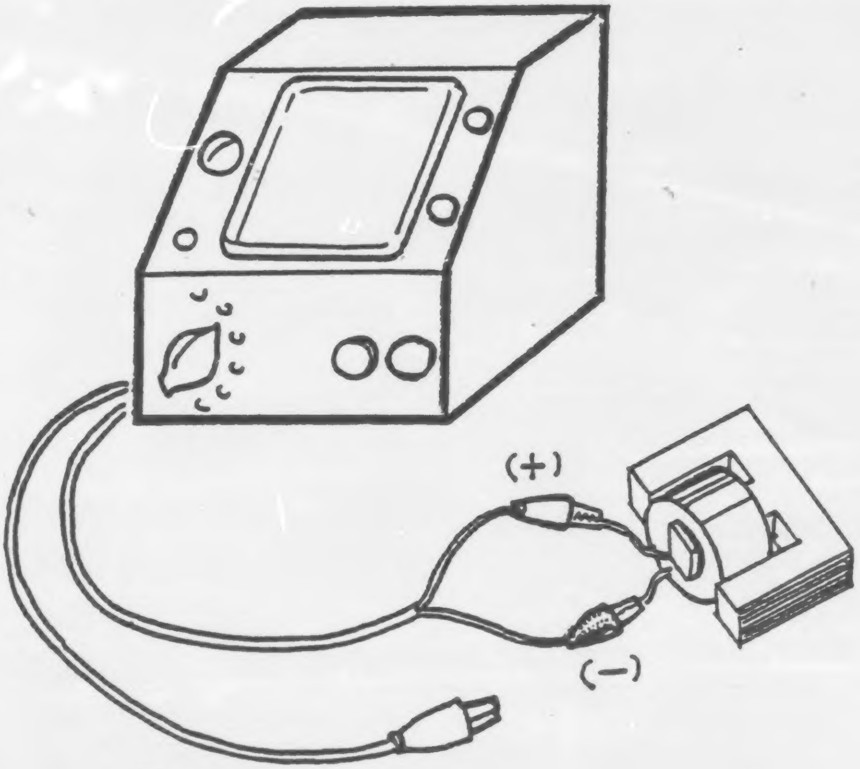
INFORMATION

RESISTANCE IS MEASURED IN OHMS. ONE OHM IS ONE UNIT OF RESISTANCE. ANY RESISTANCE STOPS THE FLOW OF ELECTRIC CURRENT.

THIS IS WHAT YOU'RE GOING TO DO. YOU WILL CHECK THE COIL. CURRENT FLOWS THROUGH THE PRIMARY WINDING OF THE COIL (SEE MOD 7501 13 002). THE REASON FOR CHECKING, IS TO SEE IF THERE IS RESISTANCE TO THE FLOW OF THE CURRENT THROUGH THE COIL.

MAXIMUM RESISTANCE IS A COMPLETE OPEN CIRCUIT. IF THE METER DOESN'T READ WITHIN A SPECIFIED LIMIT, THE COIL MUST BE REPLACED.

HOOK UP THE TESTER AS IN THE PICTURE BELOW.



WORD GUIDE

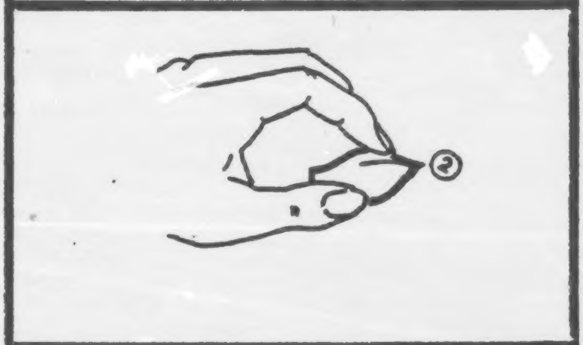
CLIP - FASTEN

JOB STEPS

READ: LOOK:

1. GATHER ALL MATERIALS AND TAKE THEM TO YOUR WORK AREA.

2. TURN SELECTOR SWITCH TO NUMBER 2 POSITION. (DISTRIBUTOR RESISTANCE)

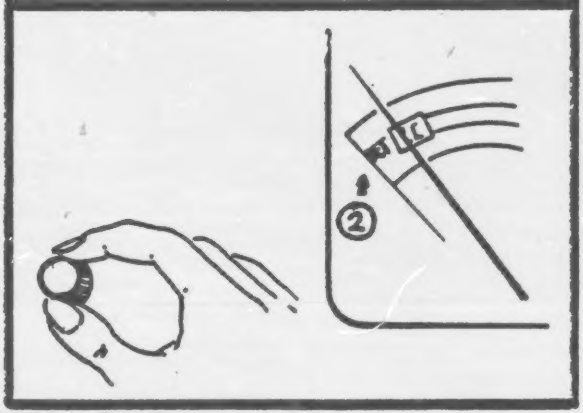


3. YOU ARE NOW GOING TO CHECK LOW OHM RESISTANCES:

   A) TURN METER ADJUSTMENT KNOBS FOR SCALE #2.

   B) TURN UNTIL THE METER NEEDLE LINES UP ON THE SET POSITION ON THE LEFT SIDE OF SCALE #2.

   YOU CAN NOW CHECK RESISTANCE OF 0-30 OHMS.



CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

1. ALL EQUIPMENT.
2. TURNED SELECTOR SWITCH TO NUMBER 2 POSITION.
3. LINED UP METER NEEDLE TO THE SET POSITION.

"TURN THE PAGE"

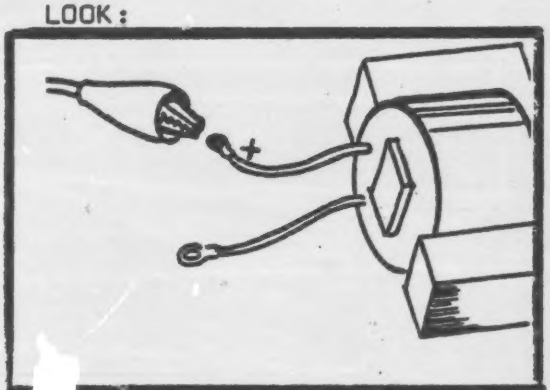
WORD GUIDE

COIL - TRANSFORMER

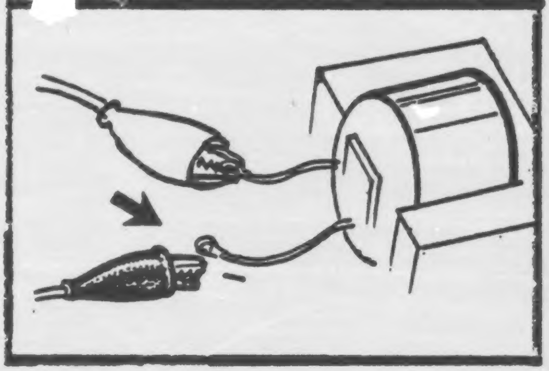
JOB STEPS

READ: LOOK:

4. CLIP SMALL RED TEST LEAD TO THE PRIMARY (POSITIVE +) SIDE OF THE COIL. →



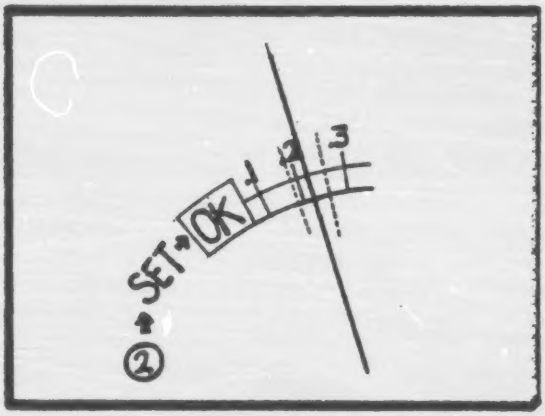
5. CLIP SMALL BLACK TEST LEAD TO THE NEGATIVE (-) SIDE OF THE COIL. →



6. BY READING THE RED NUMBERS, READ SCALE #2 RESULT.

7. FOR THE 298654 COIL, THE NEEDLE SHOULD BE BETWEEN 18-24 OHMS. →

   NOTE: IF YOU HAVE A DIFFERENT COIL, YOU MUST LOOK UP THE SPECIFICATIONS IN THE MERCOTRONIC MANUAL.



"TURN THE PAGE"

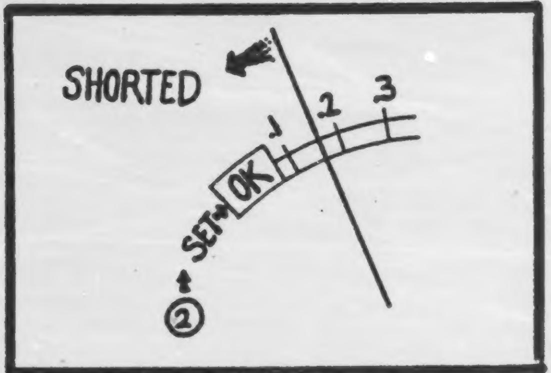
WORD GUIDE

SHORTED - TWO HOT WIRES TOUCHING.

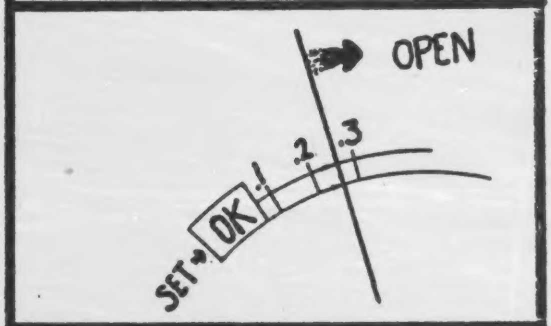
JOB STEPS

READ: LOOK:

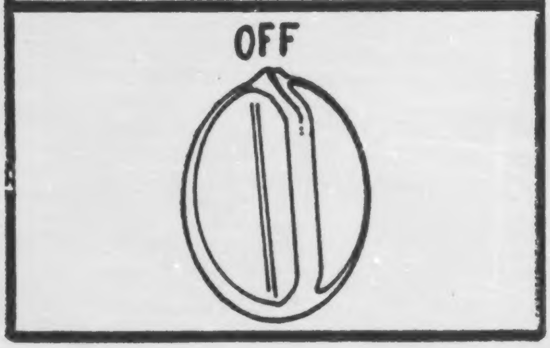
8. IF YOUR READING IS BELOW .18 OHMS, THE PRIMARY WINDING IS SHORTED.



9. IF THE METER IS ABOVE .24 OHMS, THE WINDING IS OPEN.



10. TURN THE TEST SELECTOR TO "OFF".



CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

1. CLIPPED THE RED AND BLACK TEST LEAD.
2. CORRECTLY READ THE SCALE METER.
3. CHECKED TO SEE IF COIL IS WORKING RIGHT.
4. TURNED OFF THE TESTOR.

small engine repair

unit: TEST EQUIPMENT

capital area career center

module: 7501 13 009 1
7501 13 009 3

date: 10/77

level: I

skill title: COIL CONTINUITY TEST

developed & written by: DWIGHT SMITH

visuals by: DAVE WEHRWEIN

WORD GUIDE

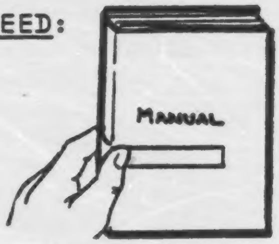
CONTINUITY - HAVING NO BREAKS

PERFORMANCE OBJECTIVE

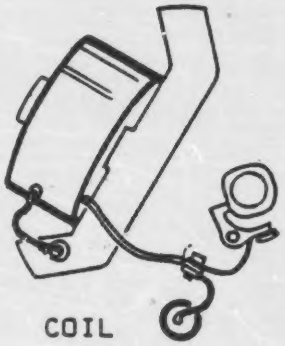
YOU ARE GOING TO LEARN:

HOW TO TEST A COIL FOR CONTINUITY WITH A MERCOTRONIC TESTER.

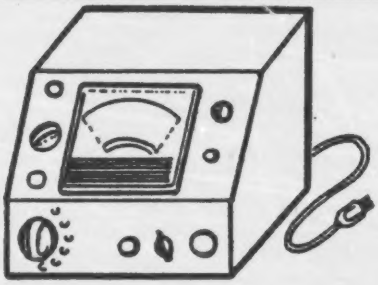
AND IN ORDER TO DO THIS YOU WILL NEED:



MERCOTRONIC TESTER MANUAL



COIL



MERCOTRONIC TESTER

SAFETY GLASSES

WE WILL KNOW YOU CAN DO IT WHEN:

1. YOU HAVE GATHERED THE EQUIPMENT AND SUPPLIES FOR THIS MOD.
2. YOU HAVE TESTED THE COIL FOR CONTINUITY BY USING THE MERCOTRONIC TESTER.
3. YOU HAVE RETURNED THE EQUIPMENT AND CLEANED UP THE WORK AREA.

"TURN THE PAGE"

WORD GUIDE

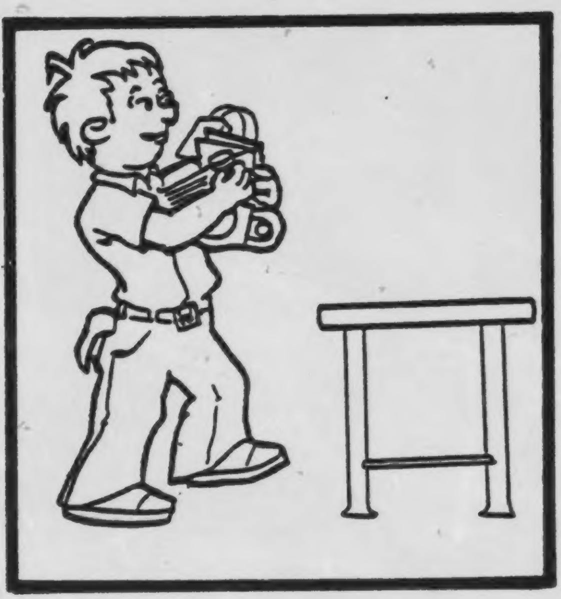
LEADS - (SAY LEEDS) TEST WIRES

JOB STEPS

READ:

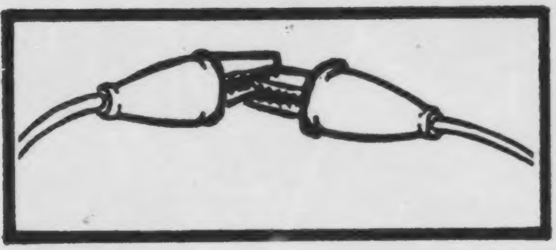
LOOK:

1. GET ALL THE EQUIPMENT AND MATERIALS AND TAKE THEM TO YOUR WORK AREA.



2. MOVE THE TESTER SELECTOR SWITCH TO THE #3 POSITION, OR "COIL CONTINUITY".

3. CLIP THE SMALL RED AND BLACK TESTER LEADS.



"TURN THE PAGE"

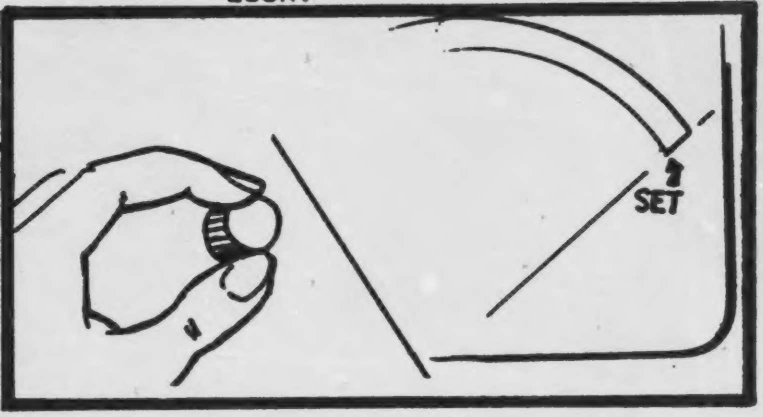
WORD GUIDE

ADJUSTMENT - CHANGE

JOB STEPS

READD: LOOK:

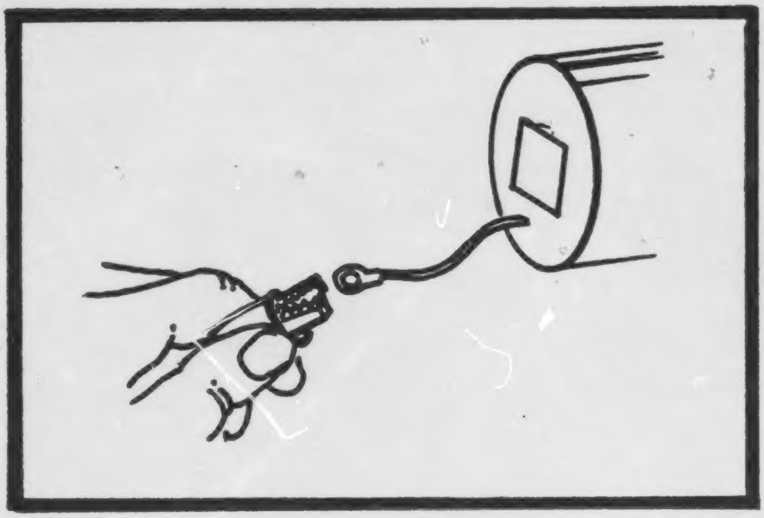
4. ZERO THE METER BY TURNING THE SCALE 3 ADJUSTMENT KNOB. BE SURE THE METER NEEDLE IS ON THE SCALE 3 SET LINE ON THE RIGHT SIDE. →



CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

1. ALL THE EQUIPMENT FOR THIS MOD.
2. CLIPPED THE SMALL RED AND BLACK TESTER LEADS.
3. ZEROED THE METER CORRECTLY.

5. UNCLIP THE TEST LEADS.



6. CLIP THE SMALL BLACK TEST LEAD TO THE COIL GROUND. →

"TURN THE PAGE"

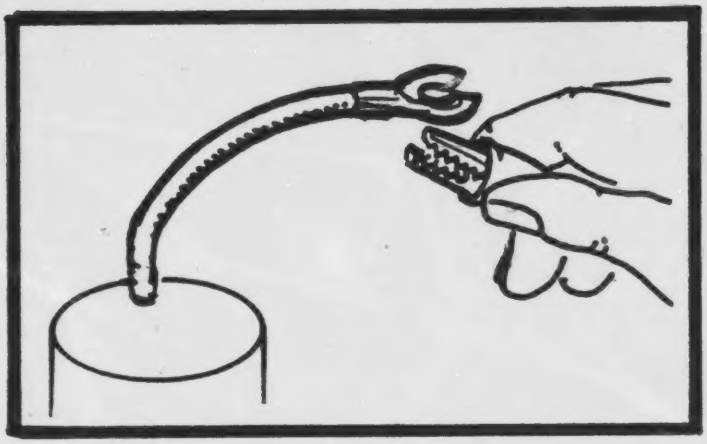
WORD GUIDE

SHORTED - BLOCKED; ELECTRICITY WON'T FLOW THROUGH

JOB STEPS

READ: LOOK:

7. CLIP THE RED TEST LEAD TO THE SPARK PLUG HIGH TENSION WIRE. →



8. THE METER SHOULD READ BETWEEN 25 AND 35 OHMS. BE SURE TO READ THE BOTTOM NUMBERS ON THE #3 SCALE.

NOTE: IF THE COIL IS NOT A 298654 COIL, LOOK UP THE "RESISTANCE NUMBER" IN THE MERCOTRONIC MANUAL.

CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

1. UNCLIPPED THE TEST LEADS.
2. CLIPPED THE SMALL BLACK TEST LEAD TO THE COIL GROUND.
3. CLIPPED THE RED TEST LEAD TO THE SPARK PLUG HIGH TENSION WIRE.
4. LOOKED UP COIL RESISTANCE NUMBER IN THE MERCOTRONIC MANUAL, IF NEEDED.

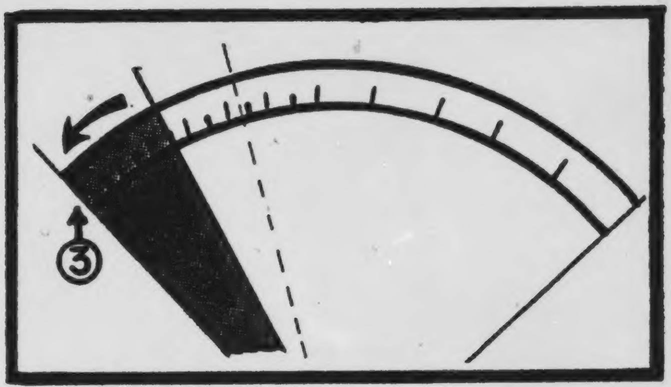
9. IF THE METER READS LESS THAN 25 OHMS, THE COIL IS SHORTED.

"TURN THE PAGE"

JOB STEPS

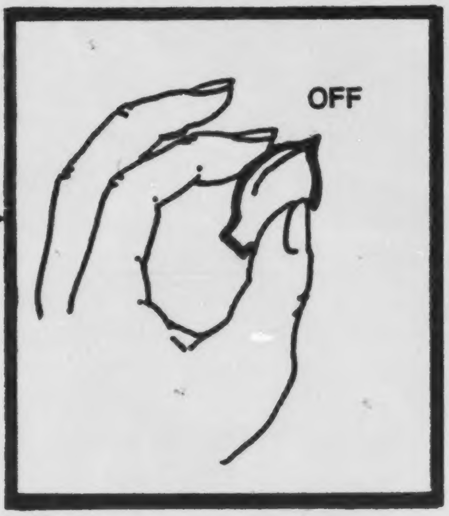
READ: LOOK:

10. IF THE METER READS MORE THAT 35 OHMS, THE SECONDARY WINDING HAS NO CONTINUITY, OR IS "OPEN".



11. IF THE COIL DOES NOT PASS THIS TEST, TELL YOUR INSTRUCTOR THAT YOU NEED A NEW ONE.

12. TURN THE SELECTOR SWITCH TO "OFF" AND UNCLIP THE TEST LEADS.



CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

1. CHECKED TO SEE IF THE COIL READS LESS THAN 25 OHMS OR MORE THAN 35 OHMS.
2. TURNED THE SELECTOR SWITCH TO "OFF" AND UNCLIPPED THE TEST LEADS.
3. PUT AWAY THE EQUIPMENT AND CLEANED UP THE WORK AREA.

6

small engine repair

unit: MOTORCYCLE

capital area career center

module: 7501 14 001 1
7501 14 001 3

date: 8/77

level:

skill title: TIMING A SINGLE CYLINDER (FLYWHEEL COVERING POINT) MAGNETO SYSTEM ONLY

developed & written by: DWIGHT SMITH

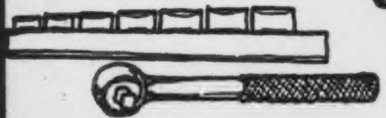
visuals by: DAVE WEHRWEIN

PERFORMANCE OBJECTIVE

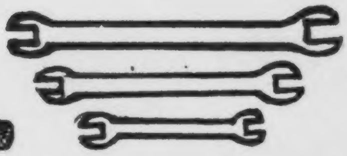
YOU ARE GOING TO LEARN:

HOW TO SET THE POINTS AND TIME A SINGLE CYLINDER ENGINE.

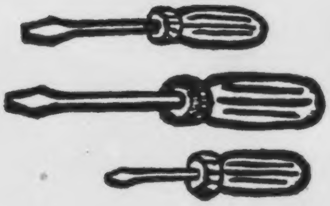
AND IN ORDER TO DO THIS YOU WILL NEED:



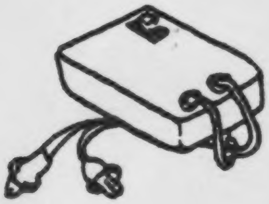
SOCKET SET



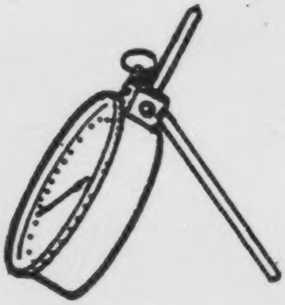
OPEN-END WRENCH SET



SCREWDRIVER SET



BUZZ BOX

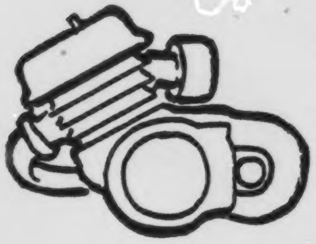


DIAL INDICATOR

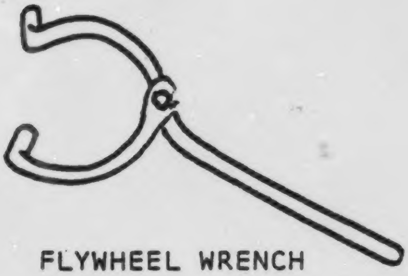
MANUFACTURER'S MANUAL

SAFETY GLASSES

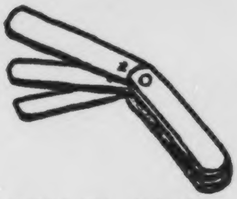
"TURN THE PAGE"



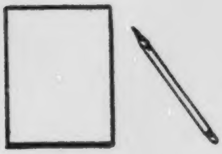
ONE-CYLINDER ENGINE WITH
FLYWHEEL COVERING THE POINTS



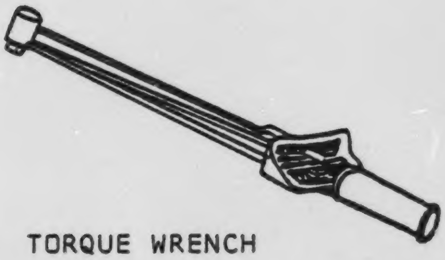
FLYWHEEL WRENCH



FEELER GAUGE SET



PENCIL AND PAPER



TORQUE WRENCH

WE WILL KNOW YOU CAN DO IT WHEN:

YOU HAVE SET THE POINTS WITHIN ±.002 OF THE SERVICE MANUAL SPECS BY USING THE BUZZ BOX AND DIAL INDICATOR.

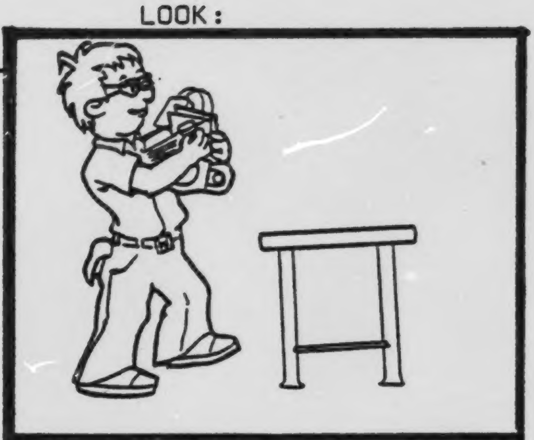
"TURN THE PAGE"

JOB STEPS

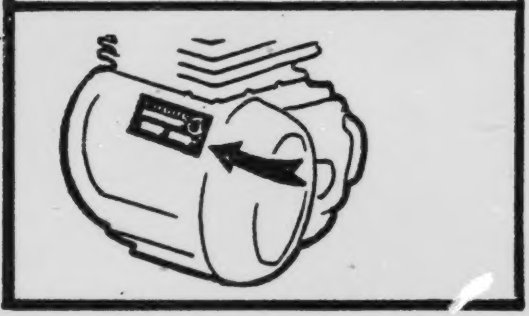
READ:

LOOK:

1. TAKE ALL EQUIPMENT TO YOUR WORK AREA. WEAR YOUR SAFETY GLASSES.



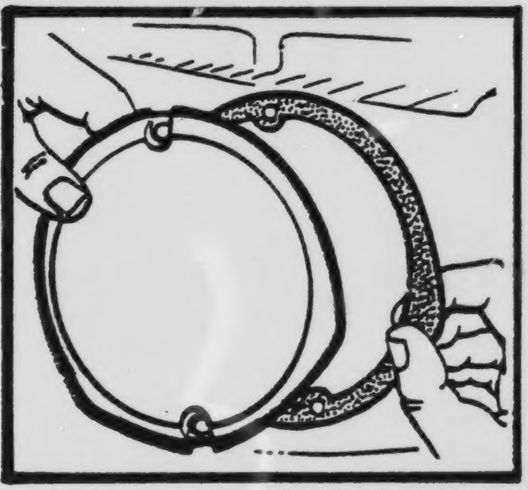
2. LOOK AT THE NAME PLATE ON THE ENGINE AND FIND THE SERIAL NUMBER AND MODEL OF THE ENGINE.



CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

1. ALL THE TOOLS FOR THIS MOD.
2. FOUND THE SERIAL NUMBER AND MODEL OF THE ENGINE.
3. THE RIGHT SERVICE MANUAL FOR YOUR ENGINE.

3. USING A PHILLIPS SCREWDRIVER, REMOVE THE SIDE CASE THAT COVERS THE MAGNETO (USUALLY, IT IS ON THE LEFT SIDE OF THE ENGINE).



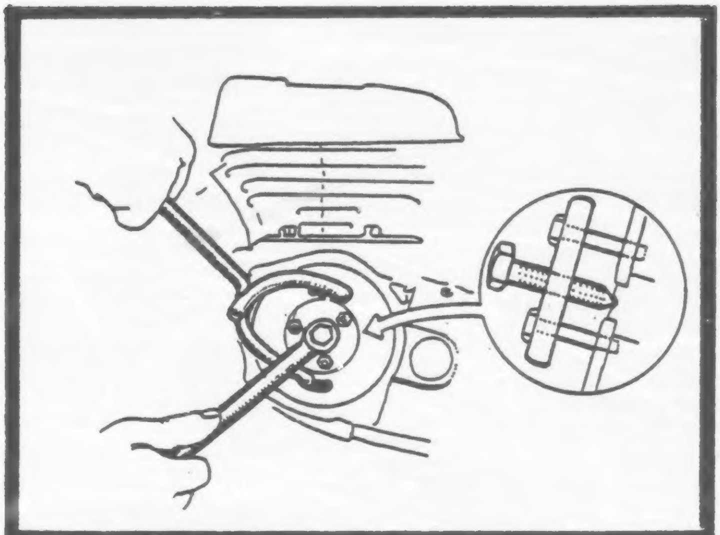
"TURN THE PAGE"

JOB STEPS

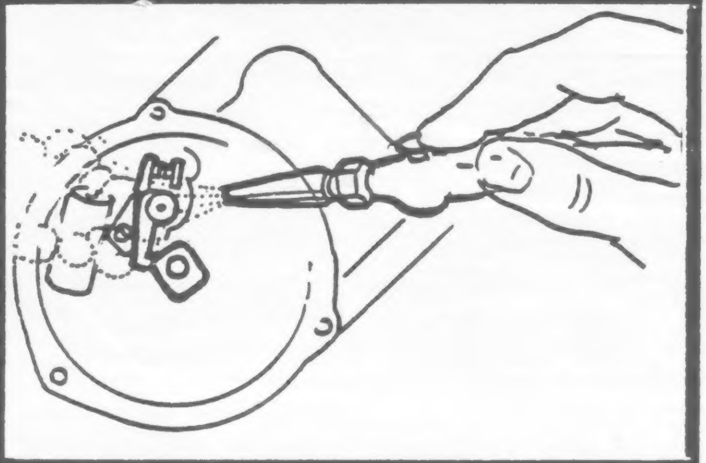
READAD: LOOK:

4. USING THE FLYWHEEL WRENCH AND THE RIGHT METRIC SOCKET, REMOVE THE FLYWHEEL. HOLD THE FLYWHEEL WITH THE FLYWHEEL WRENCH AND TAKE OFF THE HOLDING NUT ON THE SHAFT.

5. USING THE FLYWHEEL WRENCH, KEEP THE FLYWHEEL FROM TURNING WHILE YOU PULL OFF THE FLYWHEEL WITH A PULLER. →

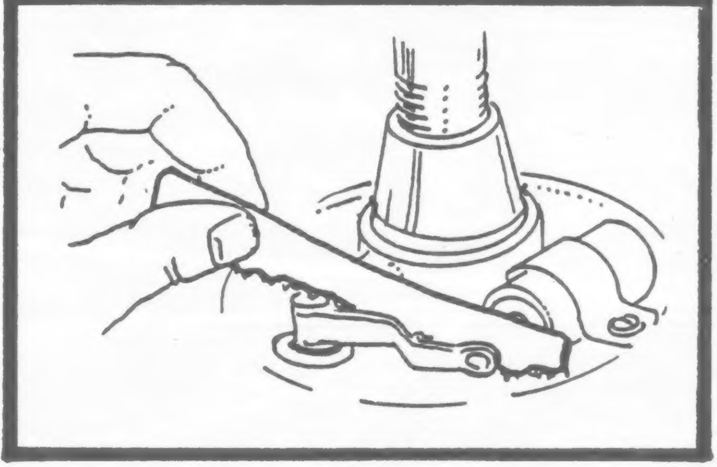


6. USING COMPRESSED AIR, BLOW DIRT OUT OF THE POINT AREA. → BE SURE TO OPEN THE POINTS BY HAND A LITTLE BIT AND BLOW OUT DIRT BETWEEN THEM.



7. USING A SMALL PIECE OF STIFF PAPER OR CARDBOARD, CLEAN THE POINTS SURFACE.

   A. OPEN THE POINTS A LITTLE WHILE SLIPPING THE END OF A STRIP OF PAPER OR CARDBOARD BETWEEN THEM. →



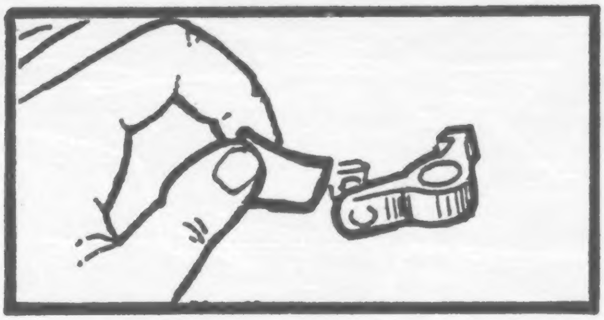
"TURN THE PAGE"

JOB STEPS

READ: LOOK:

B. RELEASE THE POINTS AND PULL THE PAPER THROUGH.

C. REPEAT THIS 3 OR 4 TIMES.

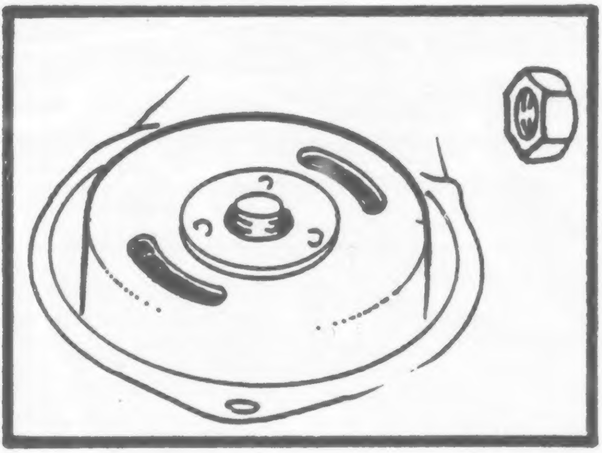


CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

1. REMOVED THE SIDE COVER OVER THE MAGNETO.
2. REMOVED THE FLYWHEEL.
3. CLEANED THE POINT AREA WITH COMPRESSED AIR.
4. CLEANED THE POINTS WITH THE PAPER.

8. LOOK AT THE WIRES. IF THEY ARE RUSTY, BROKEN OR WORN, TELL YOUR INSTRUCTOR.

9. PUT THE FLYWHEEL BACK ON THE SHAFT, BUT LEAVE OFF THE NUT.

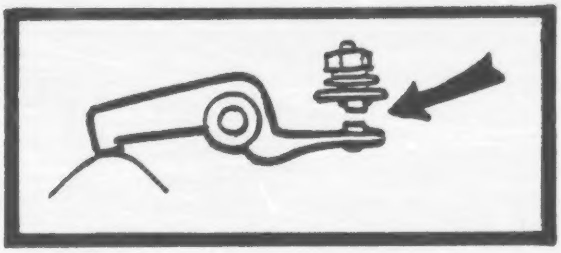


"TURN THE PAGE"

JOB STEPS

READAD: LOOK:

10. MOVE THE FLYWHEEL AROUND SO THAT THE POINTS ARE OPEN AS WIDE AS THEY CAN GO.



11. USE THE FEELER GAUGES AND SCREWDRIVERS TO SET THE POINTS TO THE SPECS IN THE SERVICE MANUAL.

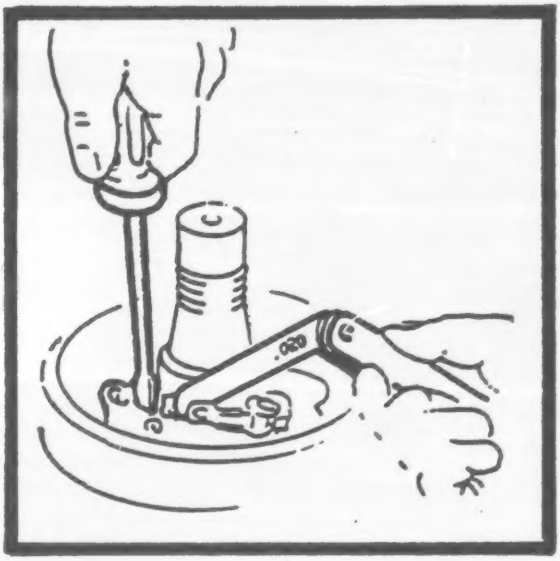
    A. LOOSEN THE HOLDING SCREW(S) SLIGHTLY.

    B. TRY TO PUT THE PROPER FEELER GAUGE BETWEEN THE POINTS.

    C. OPEN OR CLOSE THE GAP WITH A SCREWDRIVER UNTIL THE FEELER GAUGE SLIPS IN BETWEEN BY ONLY SLIGHTLY RUBBING.

    D. TIGHTEN THE POINT HOLDING SCREW(S).

    E. CHECK THE GAP AGAIN AND RESET, IF NEEDED.



CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

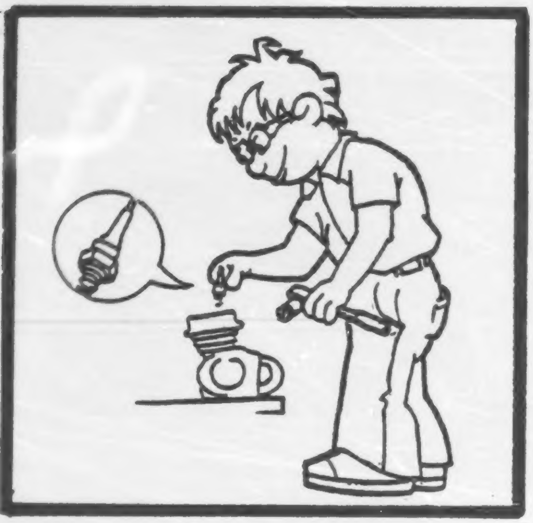
1. CHECKED FOR BURNED POINTS OR WIRES THAT ARE DAMAGED.
2. PUT THE FLYWHEEL BACK ON WITHOUT THE NUT.
3. SET THE POINTS TO THE SERVICE MANUAL SPECS.

"TURN THE PAGE"

JOB STEPS

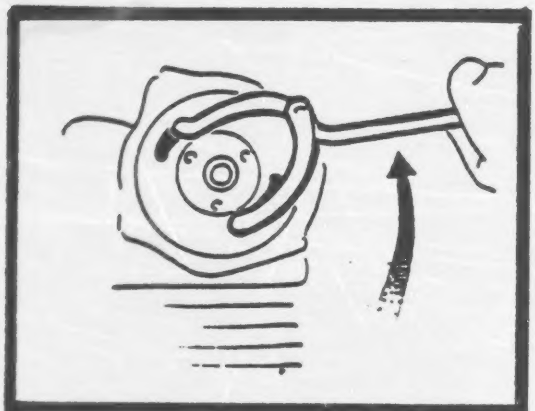
READ: LOOK:

12. REMOVE THE SPARK PLUG. →

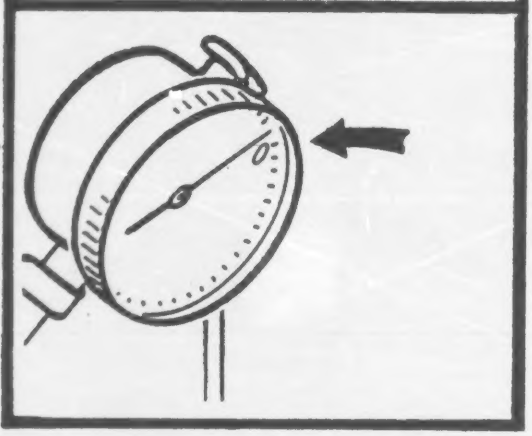


13. SCREW IN THE DIAL INDICATOR,

14. TURN THE FLYWHEEL UNTIL THE PISTON IS AT TOP DEAD CENTER. (T. D. C.) →



15. SET THE DIAL INDICATOR FACE TO ZERO. →



"TURN THE PAGE"

WORD GUIDE

BUZZ BOX - A DEVICE THAT MAKES A SOUND THAT HELPS YOU SET TIMING ON ENGINE.

B.T.D.C. - BEFORE TOP DEAD CENTER. THIS IS BEFORE POSITION GETS TO THE TOP OF ITS TRAVEL. THE PLUG FIRES HERE.

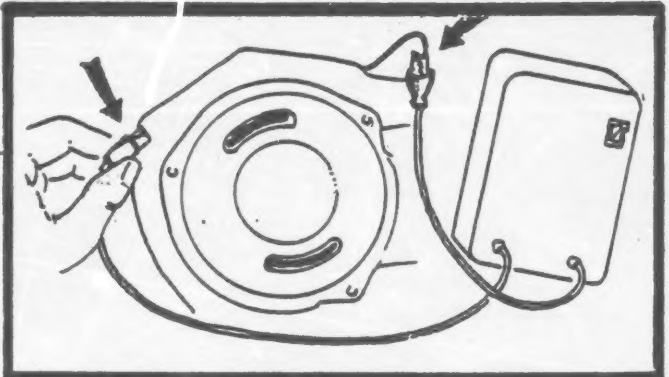
JOB STEPS

READ: LOOK:

CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

1. PUT IN THE DIAL INDICATOR RIGHT.
2. FOUND T.D.C.
3. ZEROED THE DIAL FACE.

16. ASK YOUR INSTRUCTOR TO HELP YOU HOOK UP THE BUZZ BOX. ONE LEAD GOES TO THE GROUND OF THE MACHINE, THE OTHER GOES TO THE COIL WIRE FROM THE MAGNETO. CHECK THE WIRE CODE FROM THE MANUFACTURER. →



17. FIND THE SERVICE MANUAL SPECS FOR THE TIMING. IT IS EITHER MILLIMETERS OR IN THOUSANDTHS OF AN INCH B.T.D.C. WRITE DOWN THE SPEC. →

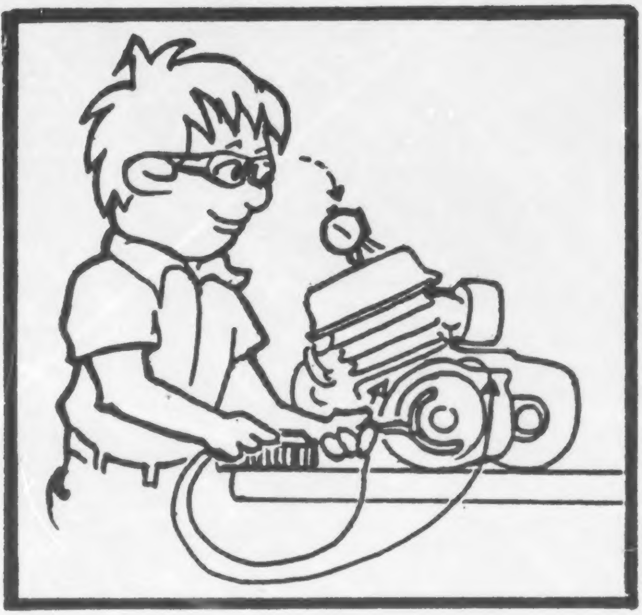
18. BACK OFF THE FLYWHEEL THE DISTANCE FOUND IN JOB STEP 17. BE SURE YOU MOVE THE FLYWHEEL THE WAY THE ENGINE TURNS.

"TURN THE PAGE"

JOB STEPS

READ: LOOK:

19. TURN THE FLYWHEEL DOWN ABOUT ANOTHER .015". WATCH THE DIAL INDICATOR AND THEN TURN ON THE BUZZ BOX.



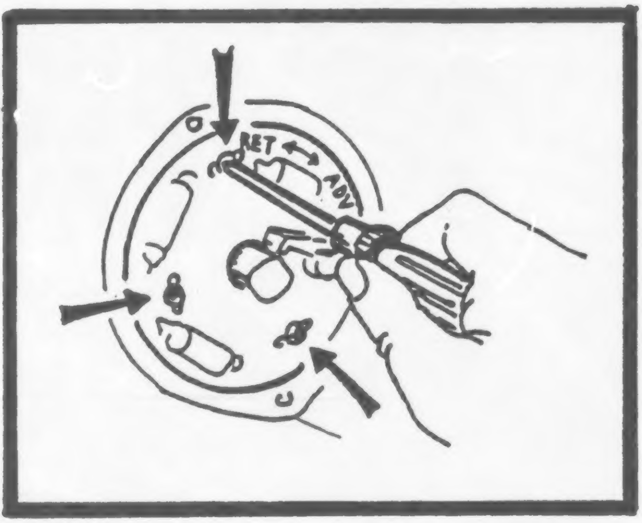
20. SLOWLY TURN THE FLYWHEEL BACK UP TO T.D.C. (ZERO ON THE DIAL INDICATOR). LISTEN TO THE TONE FROM THE BUZZ BOX.

NOTE: WHEN YOU REACH THE POINT THAT IS THE DISTANCE BTDC YOU FOUND BEFORE, THE TONE FROM THE BUZZ BOX SHOULD CHANGE. IF THE TONE CHANGES, THE TIMING IS SET CORRECTLY. IF THE TONE DOES NOT CHANGE, YOU MUST SET THE TIMING.

CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

1. HOOKED-UP THE BUZZ BOX RIGHT.
2. FOUND THE RIGHT TIMING NUMBER.
3. CHECKED THE TIMING AND CAN TELL IF IT IS RIGHT OR NOT, AND WHY.

21. IF THE TONE CHANGES BEFORE OR AFTER THE RIGHT SPOT, (THE DISTANCE B.T.D.C. FROM THE MANUFACTURES) LOOSEN THE 3 PHILLIPS HEAD SCREWS THAT HOLD THE BACKING PLATE.



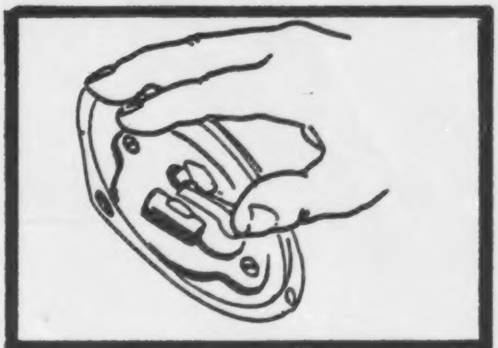
"TURN THE PAGE"

JOB STEPS

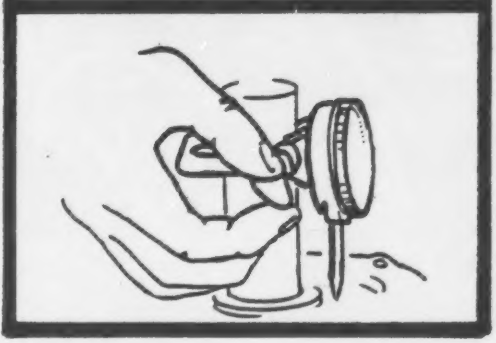
READ: LOOK:

22. MOVE THE PLATE THE RIGHT WAY TO GET THE TIMING SPOT IN THE RIGHT SPOT FOR B.T.D.C.

NOTE: SETTING THE TIMING SPOT AHEAD IS CALLED ADVANCING THE SPARK. SETTING THE TIMING SPOT BACK IS CALLED RETARDING THE SPARK.

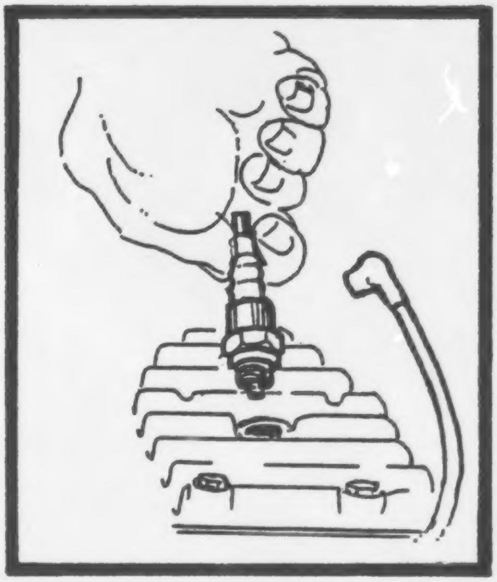


23. WHEN THE TIMING IS SET RIGHT, REMOVE THE DIAL INDICATOR.



24. CLEAN AND GAP THE SPARK PLUG.

25. INSTALL THE SPARK PLUG.

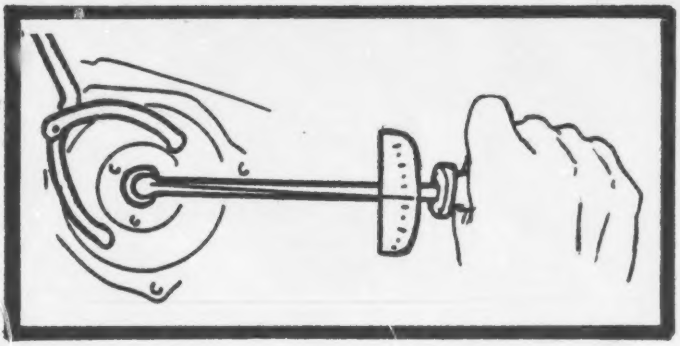


"TURN THE PAGE"

JOB STEPS

READ: LOOK:

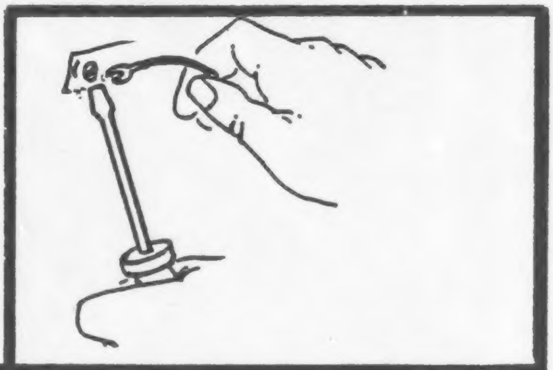
26. PUT THE HOLDING NUT ON THE FLYWHEEL AND TORQUE IT TO THE SERVICE MANUAL SPECS. →



CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

1. SET THE TIMING RIGHT.
2. CLEANED AND GAPPED THE SPARK PLUG, OR PUT IN A NEW ONE.
3. PUT ON THE FLYWHEEL AND TORQUED THE NUT THE RIGHT AMOUNT.

27. HOOK THE COIL WIRE BACK UP AND CHECK FOR A SPARK. ASK YOUR INSTRUCTOR FOR HELP. →



28. HOOK UP THE SPARK PLUG WIRE. THEN, START THE CYCLE AND CHECK HOW IT RUNS. →

#28
VARRROOM

"TURN THE PAGE"

JOB STEPS

READ:

29. IF IT RUNS WELL, CLEAN UP YOUR WORK AREA AND RETURN THE TOOLS.

30. IF IT DOES NOT RUN ACCORDING TO SPECS, RECHECK YOUR WORK. RESET THE POINTS AND/OR TIMING.

CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

1. STARTED THE ENGINE SO IT RUNS WELL.
2. CLEANED UP YOUR WORK AREA.
3. RETURNED THE TOOLS.

small engine repair

unit: MOTORCYCLE

capital area career center

module: 7501 14 002 1
7501 14 002 3

date: AUG 77

level:

skill title: TIMING A SINGLE CYLINDER - POINTS ACCESSIBLE

developed & written by: DWIGHT SMITH

visuals by: DAVE WEHRWEIN

WORD GUIDE

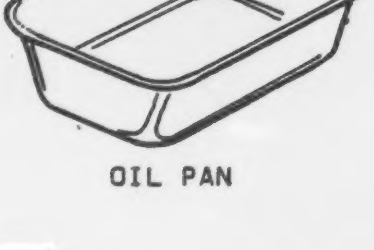
ACCESSIBLE - EASY FOR YOU TO GET TO

PERFORMANCE OBJECTIVE

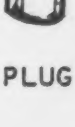
YOU ARE GOING TO LEARN:

HOW TO SET THE POINTS AND TIME A ONE-CYLINDER ENGINE WITH ACCESSIBLE POINTS.

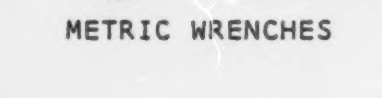
AND IN ORDER TO DO THIS YOU WILL NEED:



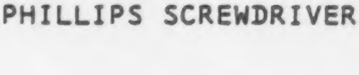
OIL PAN



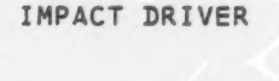
SPARK PLUG WRENCH



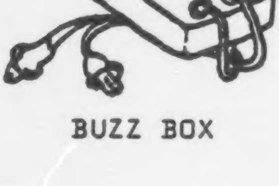
METRIC WRENCHES



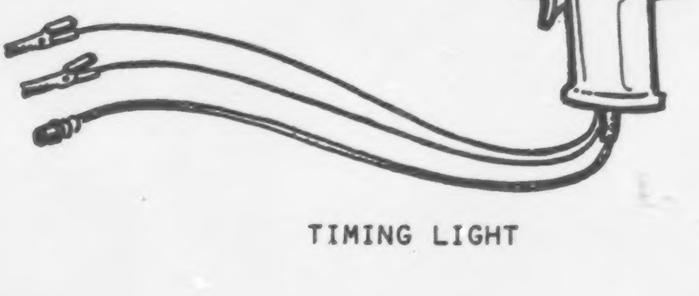
PHILLIPS SCREWDRIVER



IMPACT DRIVER



BUZZ BOX



TIMING LIGHT

MANV.
MANUAL

MANUFACTURER'S MANUAL

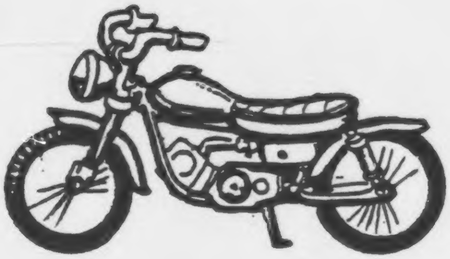
"TURN THE PAGE"

WORD GUIDE

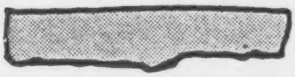
"HASH" MARKS - MARKS THAT HELP YOU ALIGN SOMETHING

ALIGN - PUT INTO PROPER POSITION

. . . YOU WILL NEED:



ONE-CYLINDER ENGINE WITH ACCESSIBLE POINTS



STRIP OF PAPER

WE WILL KNOW THAT YOU CAN DO IT WHEN:

1. YOU HAVE SET THE POINTS WITHIN ± .002 OF THE MANUFACTURER'S SPECIFICATIONS USING THE BUZZ BOX.
2. YOU HAVE SET THE "HASH" MARKS ON THE ROTOR TO LINE UP AT IDLE.
3. YOU HAVE SET THE "HASH" MARKS TO LINE UP AT 4,000 RPM.

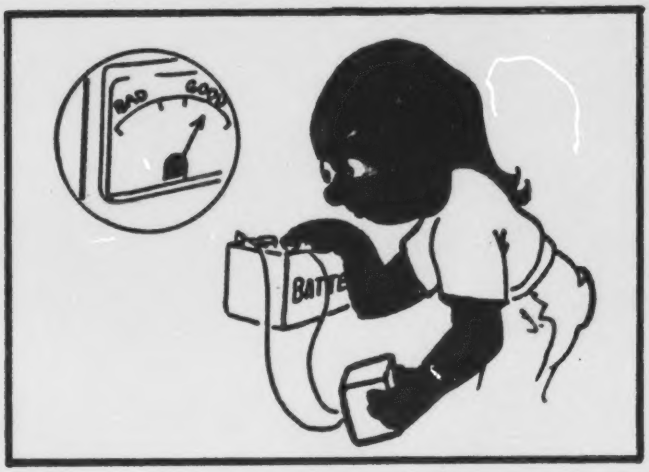
"TURN THE PAGE"

JOB STEPS

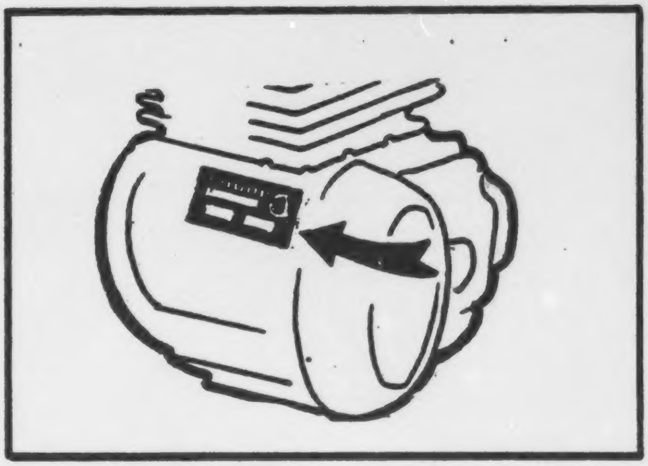
READ: LOOK:

1. TAKE ALL EQUIPMENT AND TOOLS TO YOUR WORK AREA.

NOTE: BE SURE THE BATTERY IS FULLY CHARGED; YOU CANNOT SET THE TIMING ON A BATTERY SYSTEM WITHOUT THIS.



2. CHECK THE ENGINE SERIAL NUMBER AND MODEL AND BE SURE YOU HAVE THE RIGHT MANUAL FOR IT.



CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

1. ALL THE EQUIPMENT AND TOOLS FOR THIS MOD.
2. CHECKED THE CHARGE IN THE BATTERY.
3. FOUND THE SERIAL AND MODEL NUMBERS ON THE ENGINE, AND THE RIGHT SERVICE MANUAL.

"TURN THE PAGE"

WORD GUIDE

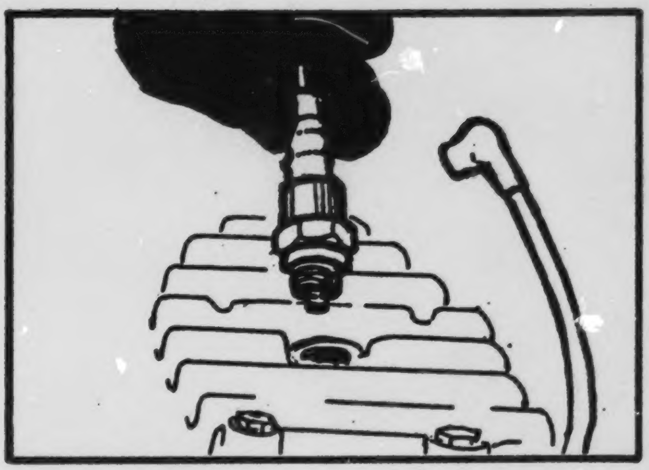
IGNITION - STARTING

JOB STEPS

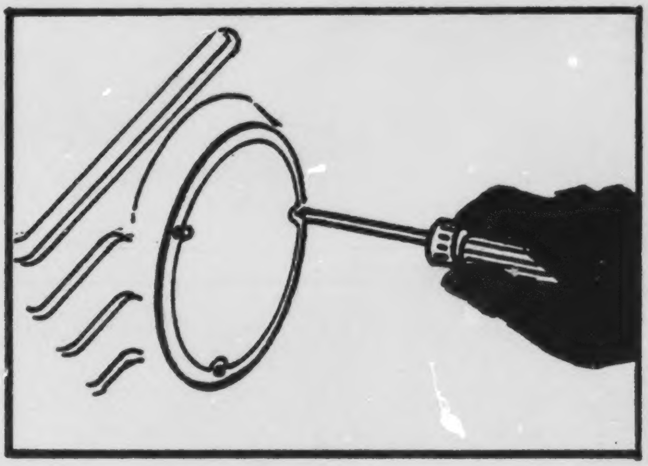
READ:

LOOK:

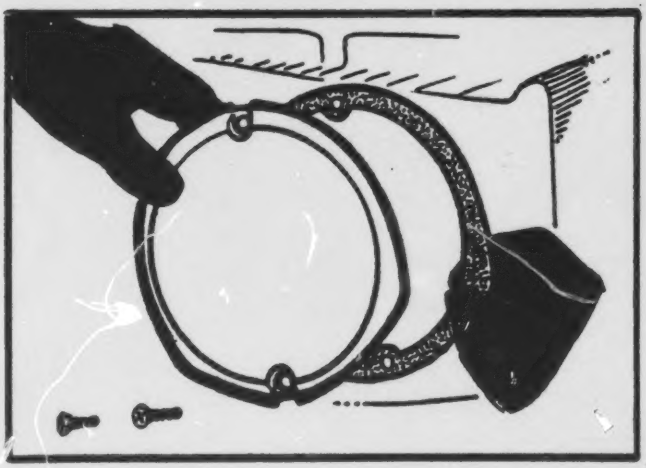
3. TAKE IGNITION WIRE OFF SPARK PLUG. THEN, USING THE SPARK PLUG WRENCH, REMOVE THE SPARK PLUG.



4. USING THE SCREWDRIVER, REMOVE THE SCREWS HOLDING ON THE LEFT SIDE COVER.



5. REMOVE THE COVER AND THE GASKET.



"TURN THE PAGE"

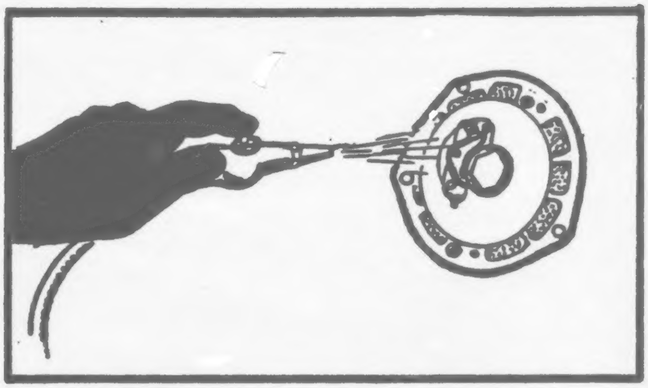
WORD GUIDE

PITTING - SMALL HOLES OR PITS

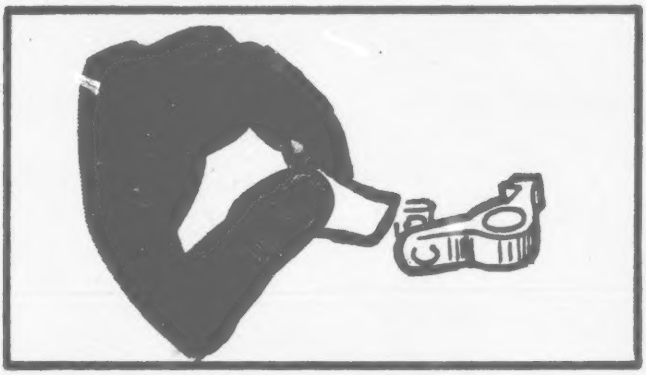
JOB STEPS

READD: LOOK:

6. USING THE COMPRESSED AIR HOSE, BLOW OUT ALL THE DIRT FROM AROUND THE POINTS. WEAR YOUR SAFETY GLASSES.



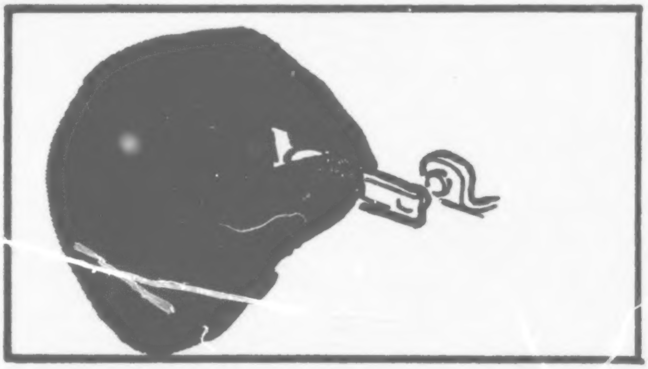
7. PULL A THIN STRIP OF PAPER THROUGH THE POINTS TO REMOVE OIL AND DIRT. DO NOT FILE THE POINTS.



CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

1. REMOVED THE SPARK PLUG.
2. REMOVED THE SIDE COVER.
3. CLEANED THE POINTS WITH COMPRESSED AIR AND THIN STRIP OF PAPER.

8. WITH YOUR FINGERS, OPEN THE POINTS JUST A LITTLE. LOOK FOR SIGNS OF WEAR, PITTING, OR BURNING. IF THE POINTS ARE IN POOR SHAPE, ASK YOUR INSTRUCTOR FOR A NEW SET.

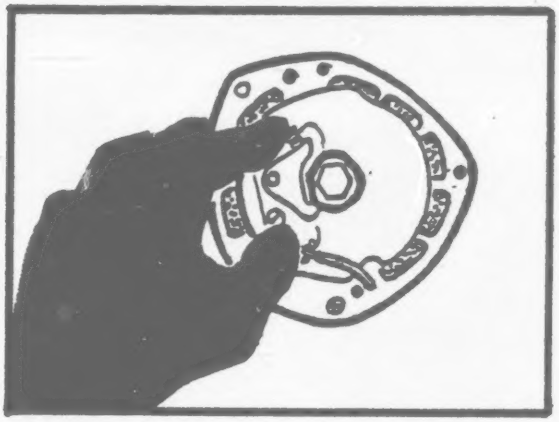


"TURN THE PAGE"

JOB STEPS

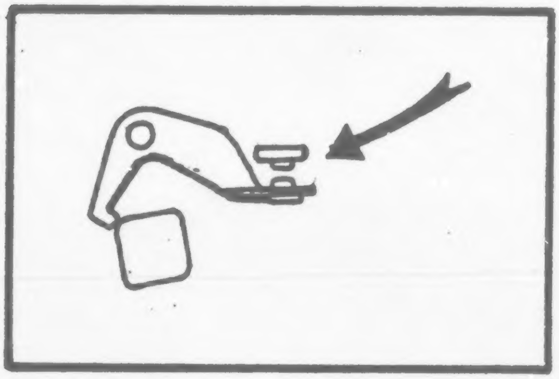
READ: LOOK:

9. PUT IN THE NEW POINTS, IF NEEDED.

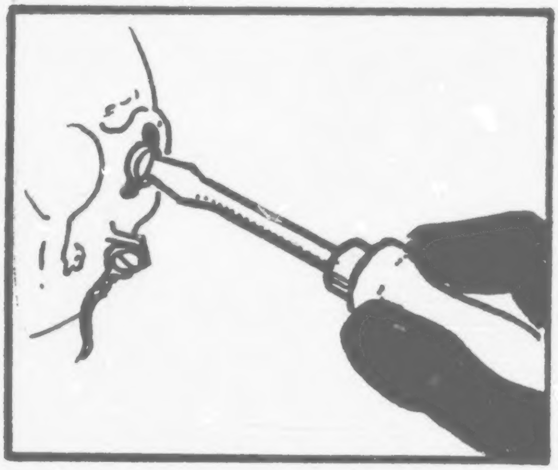


10. USING SCREWDRIVERS AND A FEELER GAUGE, SET THE POINTS TO THE MANUFACTURER'S SPECIFICATIONS STATED IN THE MANUAL.

   A. TURN THE ENGINE TO OPEN THE POINTS TO THEIR WIDEST OPENING.



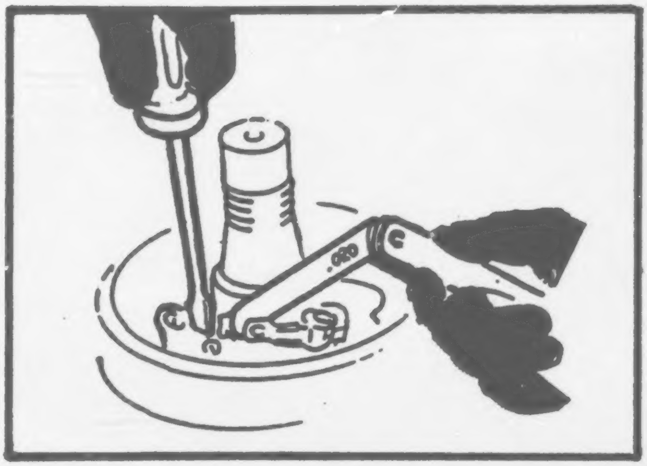
   B. LOOSEN THE HOLDING SCREWS JUST A LITTLE.



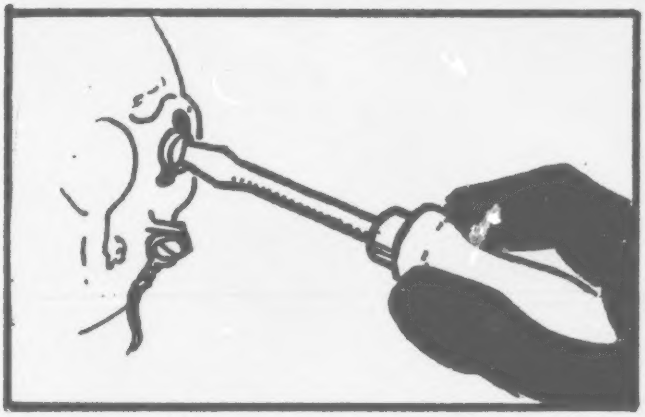
"TURN THE PAGE"

JOB STEPS

READ: LOOK:



C. SET THE OPENING SO THAT THE FEELER GAUGE SLIPS BETWEEN WITH ONLY A LITTLE RUBBING.



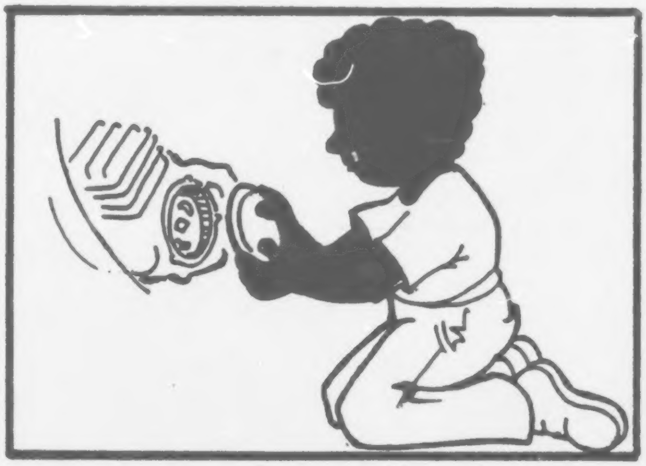
D. TIGHTEN THE HOLDING SCREWS AND RECHECK THE GAP.

CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

1. CHECKED THE POINTS, LOOKING FOR WEAR, BURNING, AND PITTING.
2. PUT IN THE NEW POINTS, IF NEEDED.
3. SET THE POINT GAP TO THE MANUFACTURER'S SPECIFICATIONS.

11. USING THE RIGHT BIT AND IMPACT DRIVER, REMOVE THE ALTERNATOR COVER.

NOTE: OIL WILL DRAIN OUT OF THIS COVER. USE THE OIL DRAIN PAN TO CATCH IT.



"TURN THE PAGE"

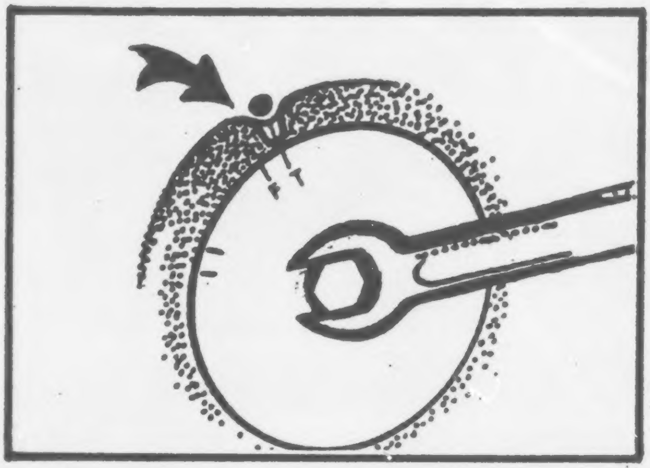
WORD GUIDE

CONNECT - PUT TOGETHER

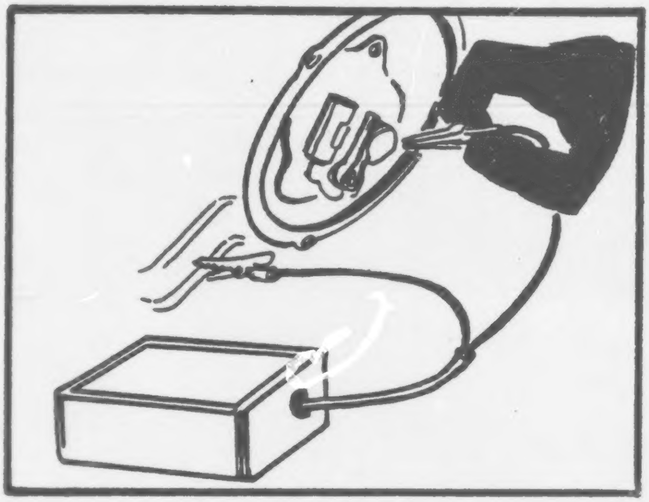
JOB STEPS

READ: LOOK:

12. THE ROTOR AND STATOR ARE NOW SHOWING. USING A WRENCH, TURN THE ROTOR SO THAT THE "T" LINES UP WITH THE MARK. CHECK TO BE SURE THAT YOU DO THIS ON THE COMPRESSION STROKE. ASK YOUR INSTRUCTOR FOR HELP.



13. CONNECT THE LEADS OF THE BUZZ BOX TO THE IGNITION WIRES. ASK YOUR INSTRUCTOR FOR HELP WITH THIS STEP.



CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

1. REMOVED THE ALTERNATOR COVER.
2. LINED UP THE MARKS ON THE ROTOR UNTIL THEY ARE RIGHT.
3. CONNECTED THE LEADS OF THE BUZZ BOX TO THE IGNITION WIRES.

"TURN THE PAGE"

WORD GUIDE

STROBE - VERY SHORT, BRIGHT LIGHT MADE BY A SPARK INSIDE A GAS-FILLED TUBE

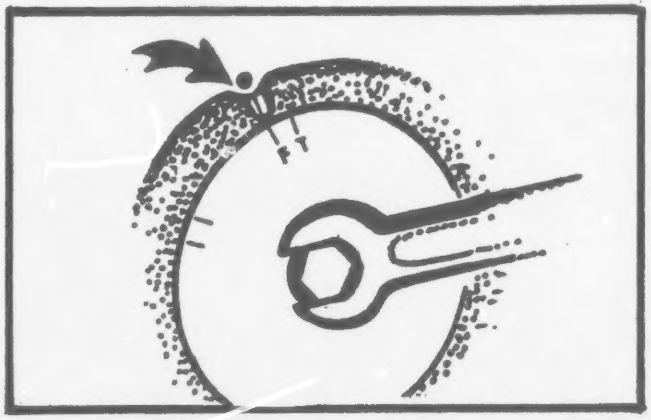
JOB STEPS

READ:

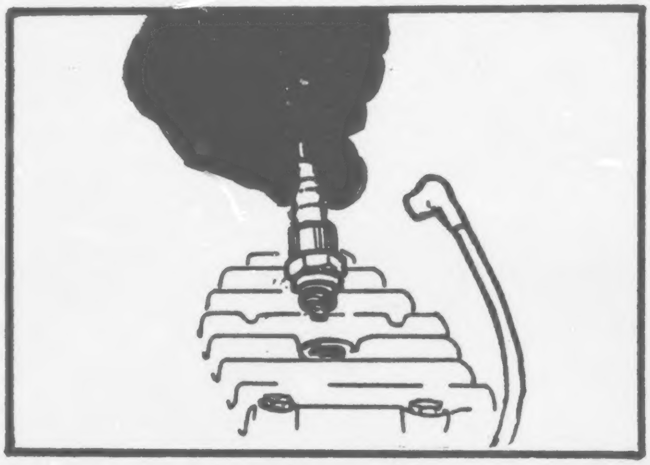
LOOK:

14. WITH A WRENCH ON THE ROTOR, SLOWLY TURN THE ENGINE. AS THE POINTS OPEN, THE "BUZZ" TONE SHOULD CHANGE WHEN THE "F" LINE (FIRE) LINES UP WITH THE INDICATOR LINE. IF THE TONE CHANGES, THE ENGINE IDLE TIMING IS SET RIGHT.
NOT, GO TO JOB STEP 23.

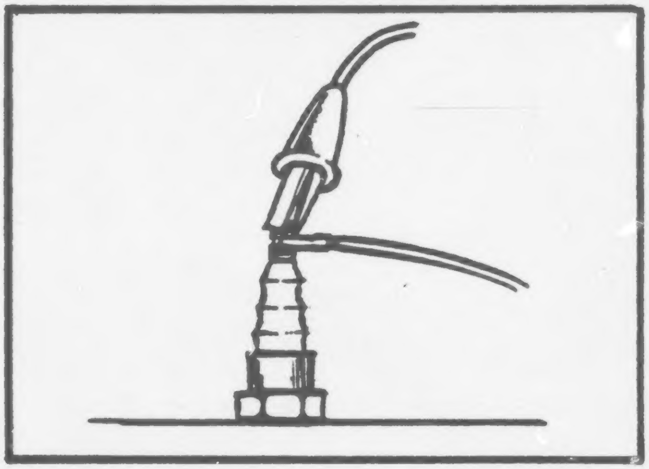
NOTE: THE OTHER TWO MARKS ON THE ROTOR ARE FOR THE ADVANCE TIMING. THE SPARK MUST BE ADVANCED AS THE ENGINE SPEEDS UP. FOR THIS, USE A STROBE-TYPE TIMING LIGHT.



15. PUT THE SPARK PLUG BACK.



16. CONNECT THE TIMING LIGHT LEAD TO THE SPARK PLUG LEAD.

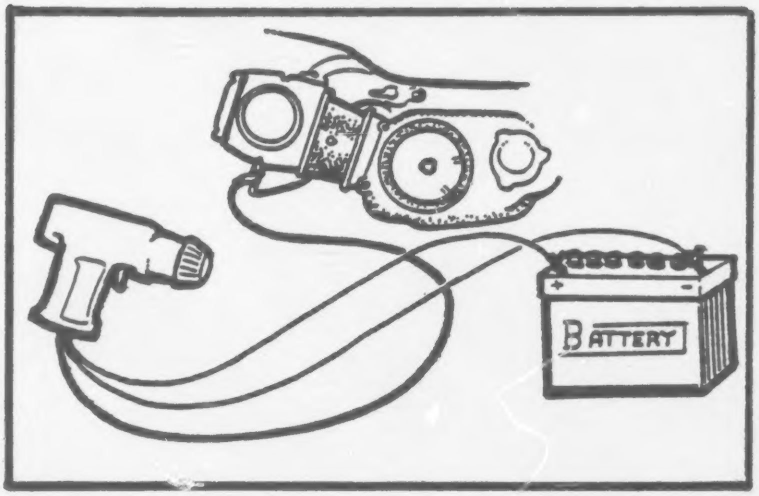


"TURN THE PAGE".

JOB STEPS

READ: LOOK:

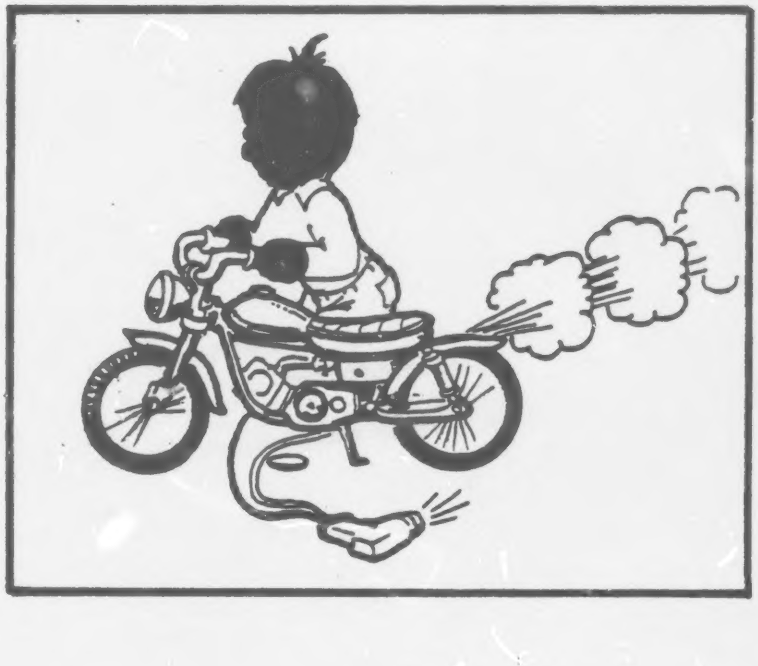
17. CONNECT THE POWER LEADS OF THE TIMING LIGHT TO A BATTERY. (USE THE BIKE'S BATTERY, IF IT IS CHARGED)



CHECK: ASK YOUR INSTRUCTOR IF YOU ARE READY TO SET THE ADVANCE TIMING. HAVE YOU:

1. SET THE RIGHT?
2. PUT SPARK PLUG IN THE ENGINE?
3. CONNECTED TIMING LIGHT TO BATTERY?

18. WITH THE TIMING LIGHT SET UP RIGHT, START THE ENGINE.



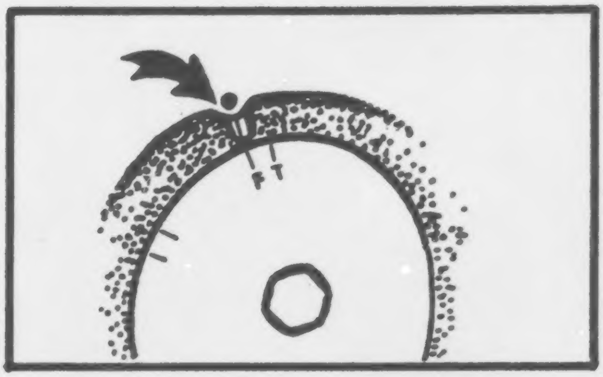
"TURN THE PAGE"

JOB STEPS

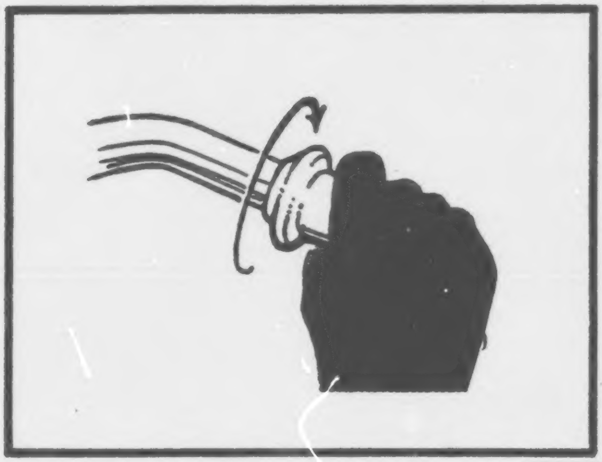
READ: LOOK:

19. PULL THE TRIGGER ON THE TIMING LIGHT AND AIM IT AT THE ROTOR.

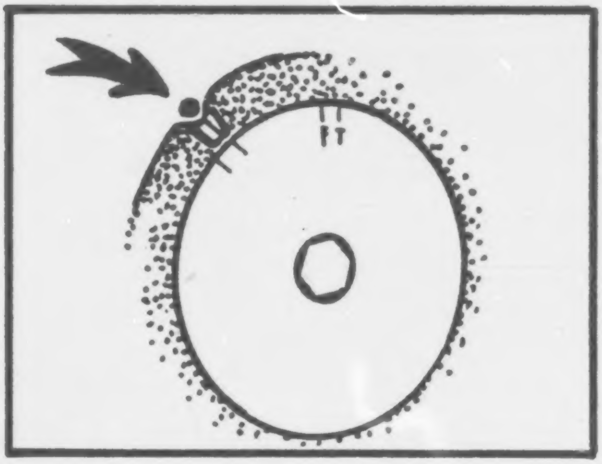
NOTE: WATCH THE TIMING MARKS ON THE ROTOR. AT IDLE, THE "F" MARK SHOULD LINE UP WITH THE NON-MOVING POINTER.



20. TURN THE THROTTLE SO THAT THE ENGINE SPEED IS 4,000 RPM. IF YOU NEED HELP, ASK SOMEONE TO TURN THE THROTTLE.



21. POINT THE STROBE LIGHT AT THE ROTOR AGAIN. THE SIDE-BY-SIDE MARKS SHOULD LINE UP WITH THE POINTER AT 4,000 RPM.



22. IF THE MARKS LINE UP AS THEY SHOULD, THE TIMING IS SET RIGHT. IF THE MARKS DO NOT LINE UP, GO TO JOB STEP 23.

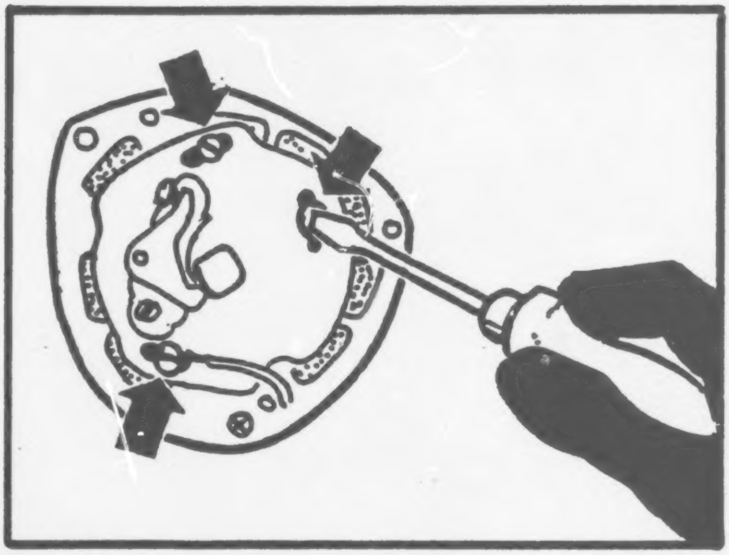
"TURN THE PAGE"

JOB STEPS

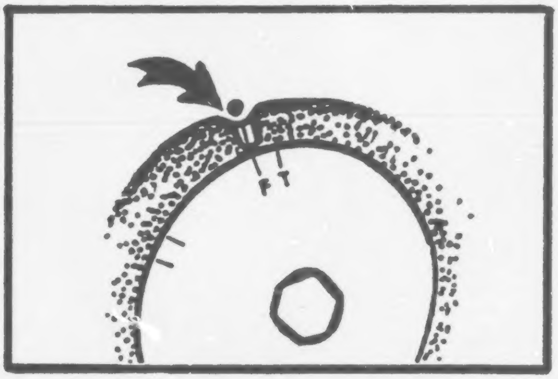
READ:

LOOK:

23. USING A SCREWDRIVER, LOOSEN THE HOLDING SCREWS ON THE POINT-BACKING PLATE JUST A LITTLE. TURN THE PLATE TO THE RIGHT OR TO THE LEFT.



24. DO JOB STEPS 14 AND 23 AGAIN UNTIL THE TONE CHANGES AT THE "F" MARK.



25. CHECK THE TIMING WITH A TIMING LIGHT (AS IN JOB STEPS 15 THROUGH 22).

26. WHEN THE TIMING IS RIGHT, ASK YOUR INSTRUCTOR TO CHECK YOUR WORK.

CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

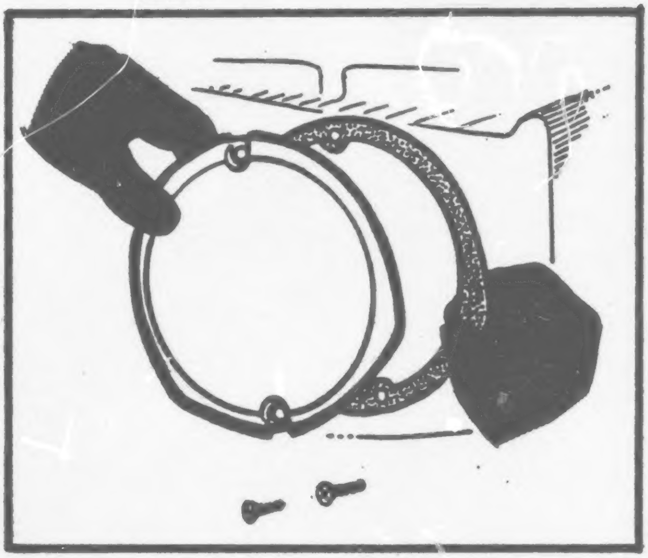
1. CHECKED THE ADVANCE TIMING AT IDLE AND 4,000 RPM.
2. SET THE RIGHT ADVANCE TIMING.

"TURN THE PAGE"

JOB STEPS

READD: LOOK:

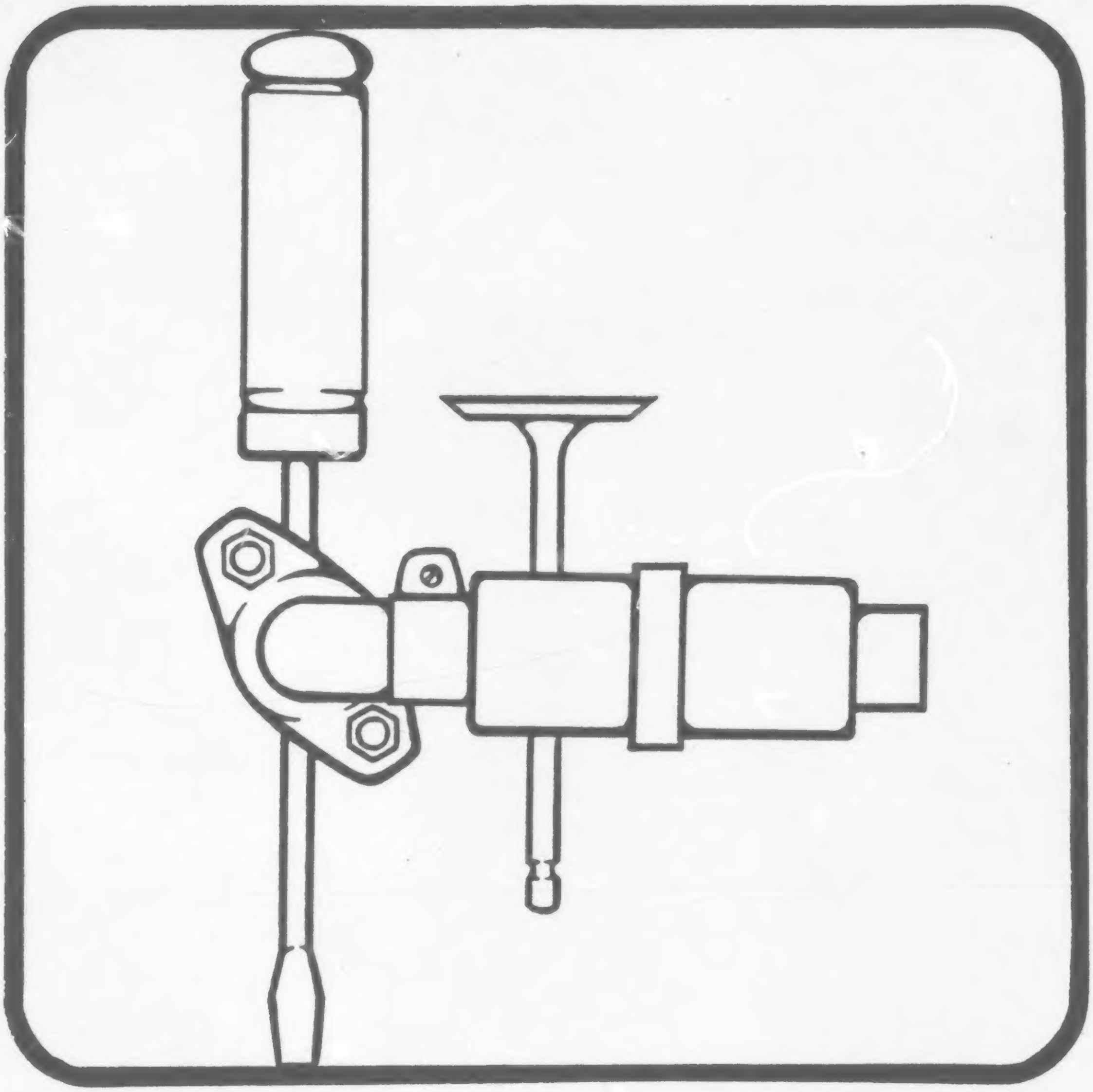
27. USING A SCREWDRIVER, PUT THE ALTERNATOR COVER BACK ON THE ENGINE. BE SURE TO PUT THE GASKET ON STRAIGHT. THEN PUT ON THE SIDE COVER.



28. CLEAN UP YOUR WORK AREA AND PUT THE TOOLS AND EQUIPMENT BACK INTO THE RIGHT PLACES.

CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

1. PUT THE ALTERNATOR BACK ON.
2. PUT THE SIDE COVER BACK ON.
3. CLEANED UP THE WORK AREA AND PUT AWAY ALL THE TOOLS AND EQUIPMENT.



small engine repair

unit: MOTORCYCLE

capital area career center

7501 14 003 1
module: 7501 14 003 3 date: AUGUST 1977 level: ____

skill title: TIMING A TWO CYLINDER WITH SINGLE POINTS
(POINTS ACCESSIBLE)

developed & written by: DWIGHT SMITH

visuals by: DAVE WEHRWEIN

WORD GUIDE

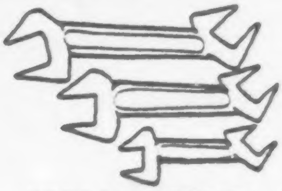
ACCESSIBLE - WITHIN REACH; EASY TO GET AT

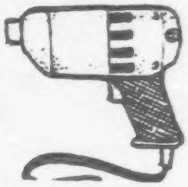
PERFORMANCE OBJECTIVE

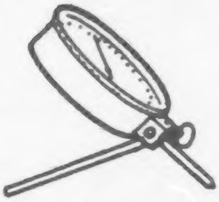
YOU ARE GOING TO LEARN:

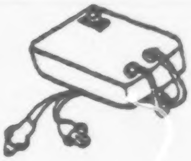
HOW TO SET THE POINTS AND TIME A 2-CYLINDER ENGINE WITH ACCESSIBLE POINTS.

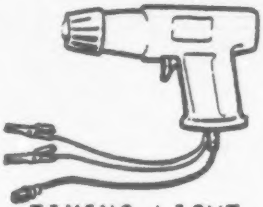
AND IN ORDER TO DO THIS YOU WILL NEED:

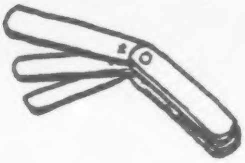

METRIC WRENCH SET

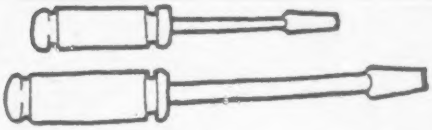

IMPACT DRIVER

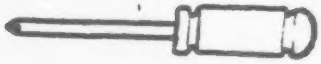

DIAL INDICATOR

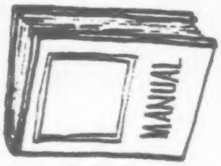

BUZZ BOX


TIMING LIGHT

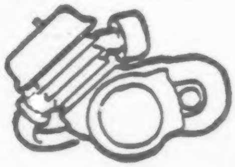

FEELER GAUGE


SCREWDRIVER SET


PHILLIPS SCREWDRIVER



MANUFACTURER'S MANUAL


2-CYLINDER, SINGLE POINT MOTORCYCLE ENGINE

HAMMER

"TURN THE PAGE"

WORD GUIDE

GUIDELINES - RULES

STATIONARY - NOT MOVING

RPM - REVOLUTIONS OR TURNS PER MINUTE

WE WILL KNOW YOU CAN DO IT WHEN:

1. YOU HAVE ALL THE EQUIPMENT FOR THIS MOD.
2. YOU HAVE SET THE POINTS TO WITHIN ± .002 OF THE MANUFACTURER'S GUIDELINES BY USING THE BUZZ BOX AND DIAL INDICATOR.
3. WITH THE ENGINE RUNNING, YOU HAVE USED THE TIMING LIGHT TO LINE UP THE "HASH" MARKS ON THE ROTOR WITH THE STATIONARY LINE.
4. YOU HAVE USED THE TIMING LIGHT TO LINE UP THE "HASH" MARKS AT 4,000 RPM.
5. YOU HAVE CLEANED UP YOUR WORK AREA AND PUT AWAY THE EQUIPMENT.

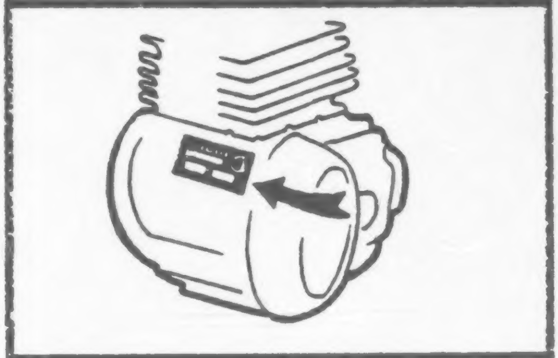
"TURN THE PAGE"

JOB STEPS

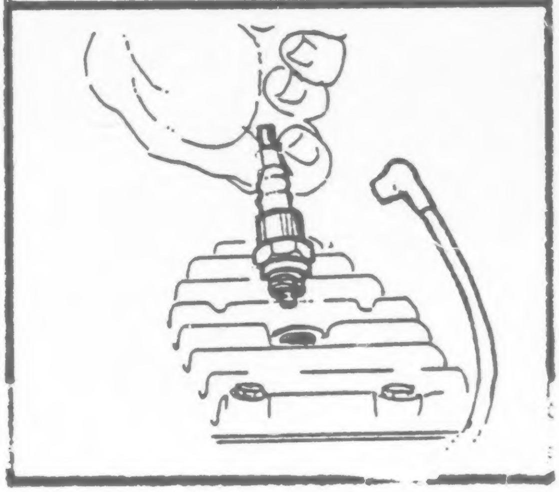
READ: LOOK:

1. TAKE THE EQUIPMENT AND TOOLS TO YOUR WORK AREA.

2. FIND THE ENGINE SERIAL NUMBER AND MODEL. BE SURE YOU HAVE THE RIGHT SERVICE MANUAL FOR THIS ENGINE.



3. USING THE SPARK PLUG WRENCH, REMOVE THE SPARK PLUG.



CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

1. ALL THE TOOLS AND EQUIPMENT FOR THIS MOD.
2. FOUND THE RIGHT SERVICE MANUAL.

3. REMOVED THE SPARK PLUG.

"TURN THE PAGE"

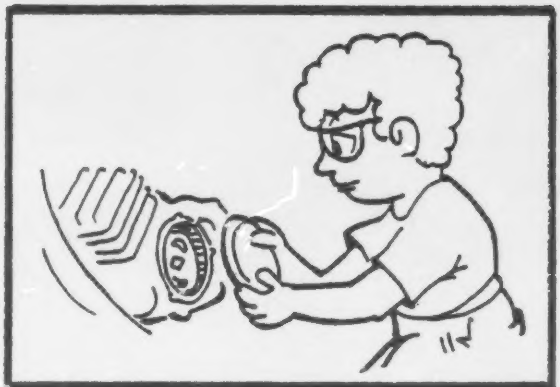
WORD GUIDE

CAREFULLY - WITH CARE

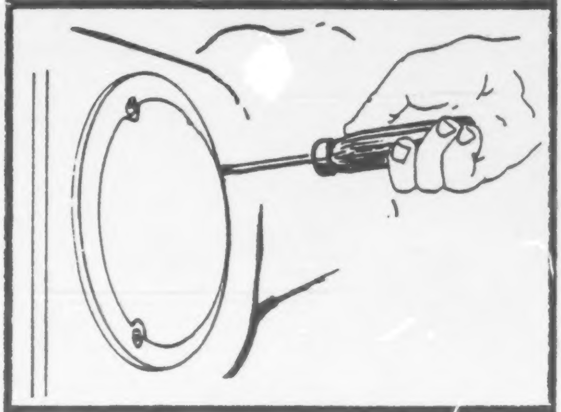
JOB STEPS

READ: LOOK:

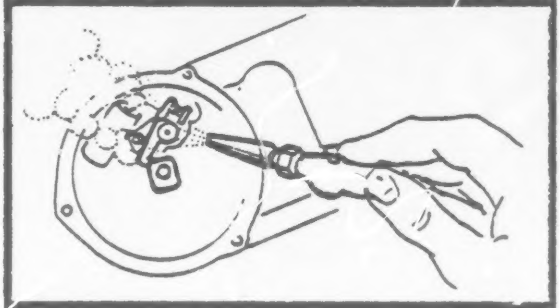
4. USING THE RIGHT SIZE SCREWDRIVER, REMOVE THE POINTS COVER PLATE ON THE SIDE OF THE ENGINE.



5. USING A SCREWDRIVER, REMOVE THE ALTERNATOR COVER PLATE SCREWS, AND THEN REMOVE THE COVER PLATE.

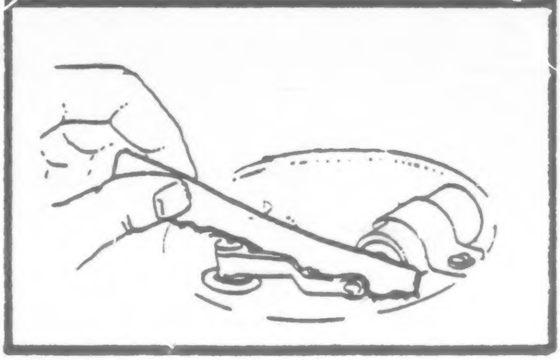


6. USING THE COMPRESSED AIR HOSE, CAREFULLY BLOW OUT THE DIRT FROM THE POINT AREA.



7. PUT A THIN STRIP OF STIFF PAPER BETWEEN THE POINTS. PULL IT BACK AND FORTH BETWEEN THE CONTACTS, 3 OR 4 TIMES TO CLEAN THE POINTS.

NOTE: DO NOT FILE THEM.



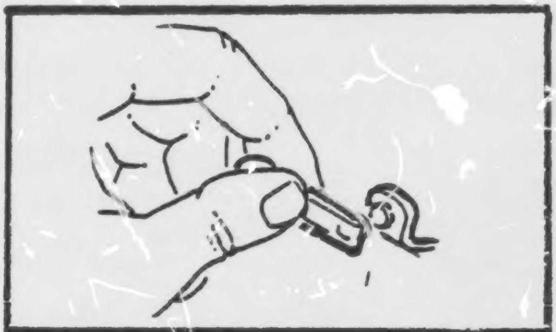
"TURN THE PAGE"

WORD GUIDE

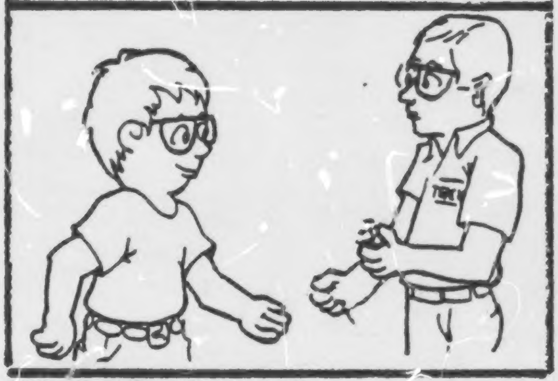
PITTING - SIGNS OF HOLES

READ: JOB STEPS LOOK:

8. LOOK AT THE POINTS. CHECK FOR SIGNS OF PITTING, WEAR, AND BURNING. IF THE POINTS SHOW ANY OF THESE SIGNS, ASK YOUR INSTRUCTOR FOR A NEW SET.



9. WHEN YOU REPLACE THE POINTS IN AN ENGINE, YOU SHOULD ALSO REPLACE THE CONDENSER. ASK YOUR INSTRUCTOR FOR A NEW CONDENSER.

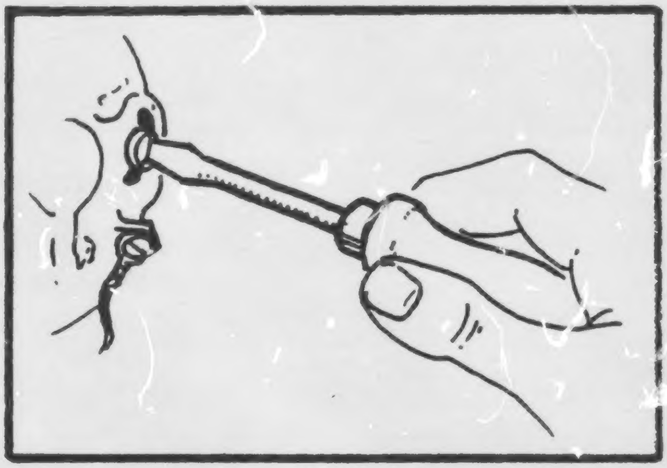


CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

1. CLEANED THE POINTS WITH COMPRESSED AIR.
2. CLEANED THE POINTS WITH STIFF PAPER.
3. CHECKED THE POINTS FOR WEAR AND DAMAGE.
4. REPLACED THE CONDENSER.

10. PUT IN THE NEW POINTS AND SET THEM TO THE MANUFACTURER'S GUIDELINES.

A. LOOSEN THE HOLDING SCREWS ON THE POINTS JUST A LITTLE.



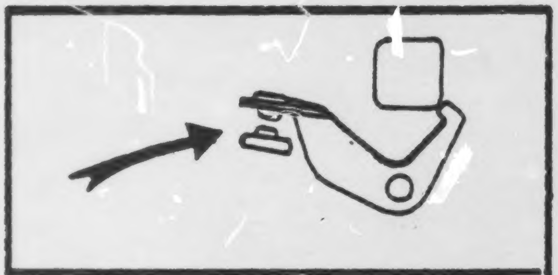
GO TO NEXT PAGE FOR "B"

"TURN THE PAGE"

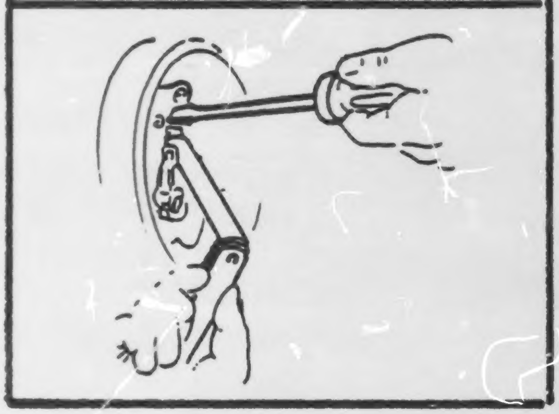
JOB STEPS

READ: LOOK:

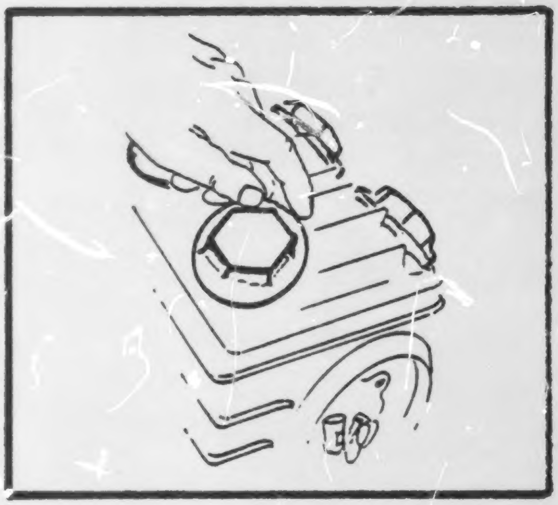
10. B. TURN THE ENGINE UNTIL
THE POINTS OPEN AS
WIDE AS THEY CAN.



C. USING THE RIGHT SIZE FEELER
GAUGE (SEE SERVICE MANUAL),
MOVE THE POINTS OPEN OR CLOSED
TO SET THEM.



D. TIGHTEN THE HOLDING SCREWS
AND CHECK THE GAP AGAIN.



11. USING A WRENCH, REMOVE ALL
4 ROCKER COVERS.

12. USING A WRENCH, TURN THE
ENGINE UNTIL THE LEFT INTAKE
VALVE OPENS.

"TURN THE PAGE"

WORD GUIDE

TDC - TOP DEAD CENTER; THE PISTON IS AT THE TOP OF ITS MOVEMENT

ALIGN - TO SET IN PROPER POSITION: TO "LINE UP"

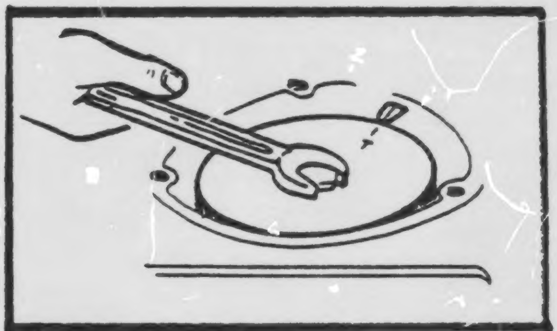
ADJUST- FIX, SET PROPERLY

READ:

LOOK:

13. KEEP TURNING UNTIL THE "T" ALIGNS WITH THE NON-MOVING MARK AS SHOWN.

NOTE: SOME ENGINE'S ROTORS HAVE MARKS WITHOUT LETTERS ON THEM.



14. NOW THE ENGINE IS AT TDC ON THE COMPRESSION STROKE FOR THE LEFT CYLINDER. ADJUST THE INTAKE AND EXHAUST VALVES FOR THIS CYLINDER.

IMPORTANT* LOOK IN THE SERVICE MANUAL FOR THE VALVE CLEARANCE GUIDELINES.

CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

1. PUT IN AND SET THE NEW POINTS PROPERLY.
2. FOUND TDC ON THE COMPRESSION STROKE FOR THE LEFT CYLINDER.
3. SET THE VALVES CORRECTLY.

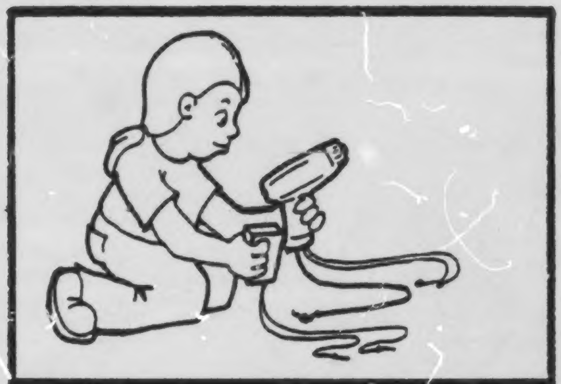
"TURN THE PAGE"

WORD GUIDE

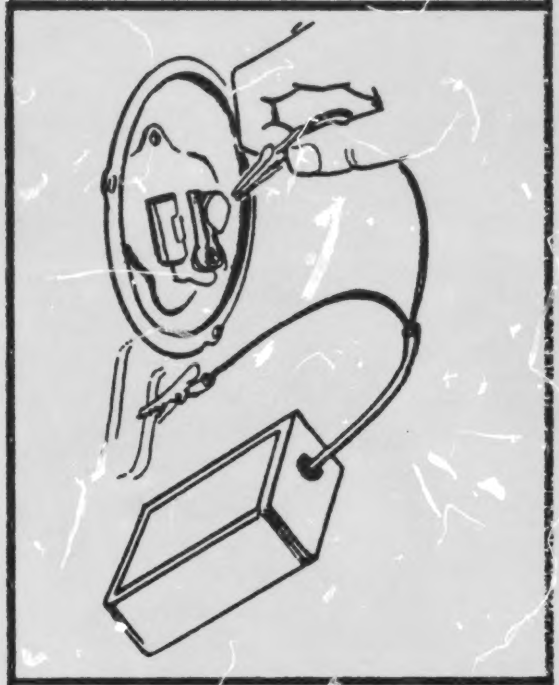
TERMINAL - BOARD WITH WIRES
CONNECT - ATTACH, LINK-UP

READ: JOB STEPS LOOK:

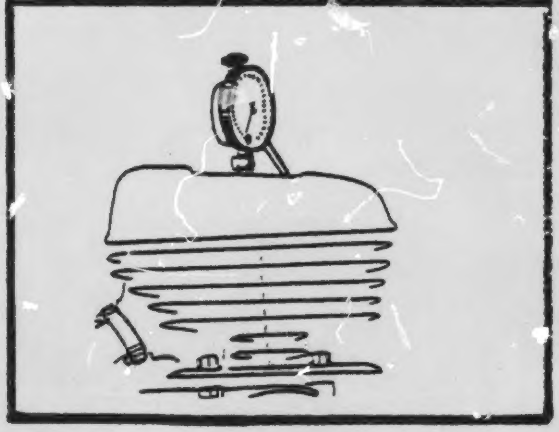
15. NOW, SET THE TIMING. YOU CAN USE EITHER A TIMING LIGHT OR A BUZZ BOX. WE WILL USE A BUZZ BOX, FIRST.



16. CONNECT ONE LEAD TO THE GROUND, AND THE OTHER TO THE CONTACT TERMINAL. TURN ON THE BOX.



17. SCREW THE DIAL INDICATOR INTO THE LEFT CYLINDER SPARK PLUG HOLE. SET IT LIKE YOU DID IN MODS&7501 06 003 1.
7501 06 003 3.



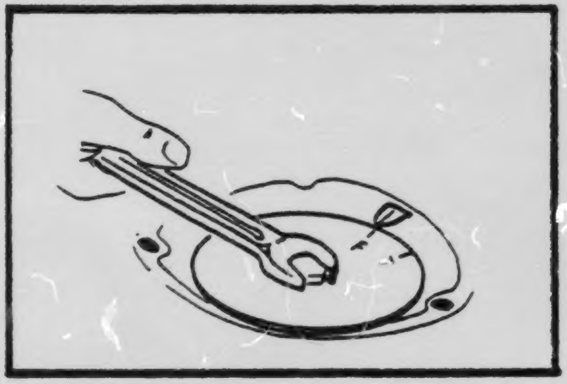
"TURN THE PAGE"

JOB STEPS

READ:

LOOK:

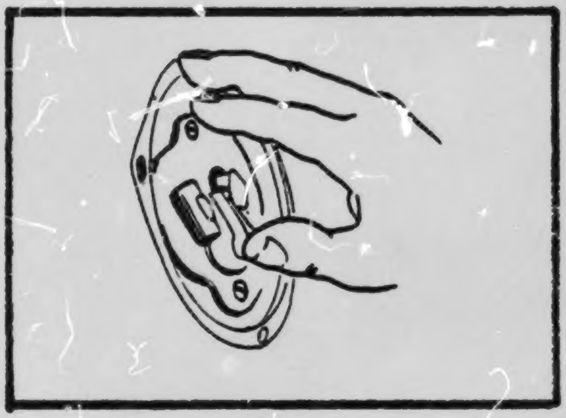
18. USING A WRENCH ON THE ROTOR, TURN THE ENGINE FORWARD. WHEN THE "F" (IF THE ENGINE HAS LETTER MARKS) LINES UP WITH THE NON-MOVING MARK, YOU SHOULD HEAR A CHANGE IN THE BUZZER TONE. IF THE TONE DOES NOT CHANGE, YOU WILL NEED TO SET THE TIMING.



CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

1. HOOKED UP THE BUZZ BOX PROPERLY.
2. PUT IN THE DIAL INDICATOR PROPERLY.
3. CHECKED THE TIMING AND CAN NOW TELL IF IT IS RIGHT OR NOT, AND WHY.

19. SET THE TIMING. USING A SCREWDRIVER, LOOSEN THE POINTS BACKING PLATE (WHERE THE POINTS ARE MOUNTED) AND MOVE THE PLATE EITHER TO THE RIGHT OR TO THE LEFT TO CHANGE THE TIMING.



20. USING THE SCREWDRIVER, TIGHTEN THE SCREWS HOLDING THE POINTS PLATE.

"TURN THE PAGE"

WORD GUIDE

VOLTAGE - AN AMOUNT OF ELECTRICITY

READ: JOB STEPS LOOK:

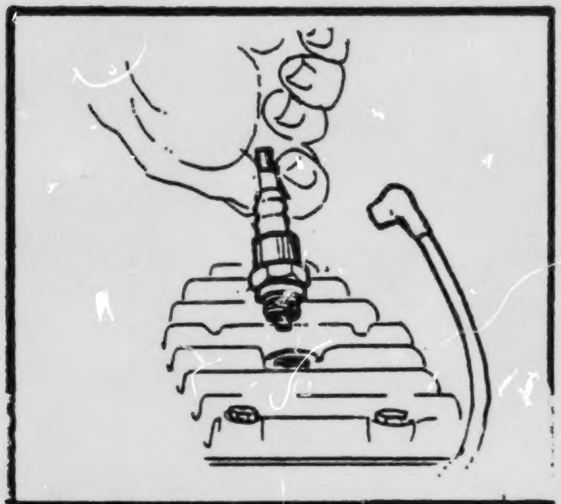
21. DO JOB STEP 17 AGAIN TO CHECK THE NEW TIMING. IF IT IS NOW RIGHT, GO TO THE NEXT STEP. IF THE TIMING IS STILL NOT RIGHT, DO JOB STEPS 17 AND 18 AGAIN UNTIL IT IS RIGHT. ASK YOUR INSTRUCTOR, IF YOU HAVE ANY QUESTIONS.

NOTE: WHEN THE TIMING IS SET RIGHT, BOTH CYLINDERS ARE TIMED RIGHT.

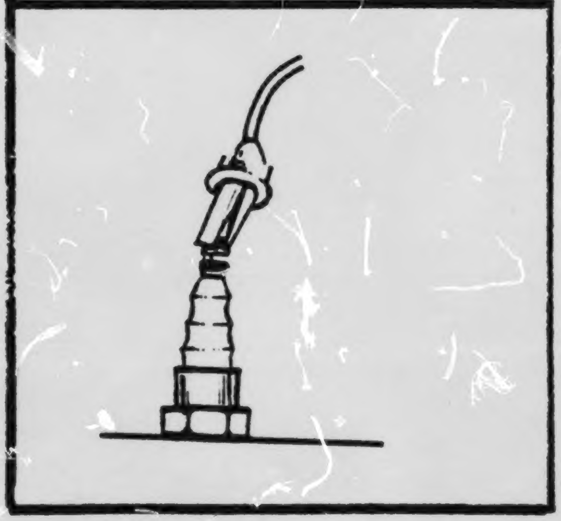
CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

1. SET THE TIMING RIGHT.

22. USING THE SPARK PLUG WRENCH, PUT THE SPARK PLUGS BACK IN.



23. HOOK-UP THE TIMING LIGHT LEAD TO THE LEFT SPARK PLUG LEAD. CONNECT BOTH SPARK PLUGS.

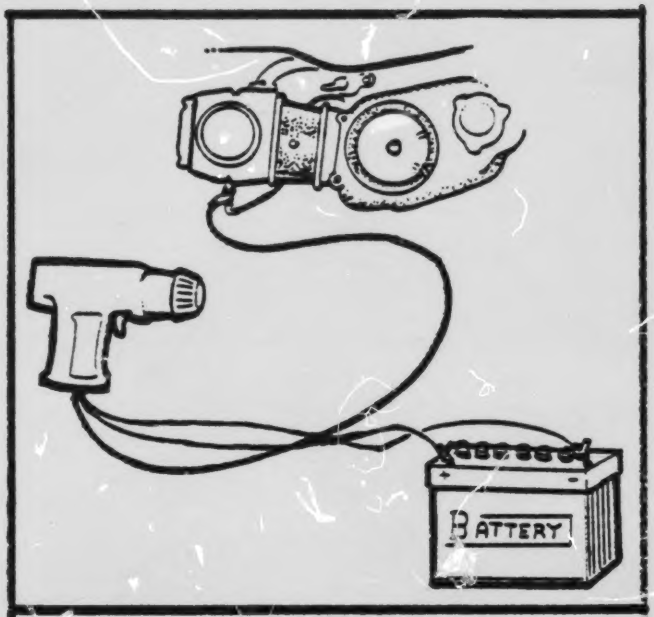


JOB STEPS

READ:

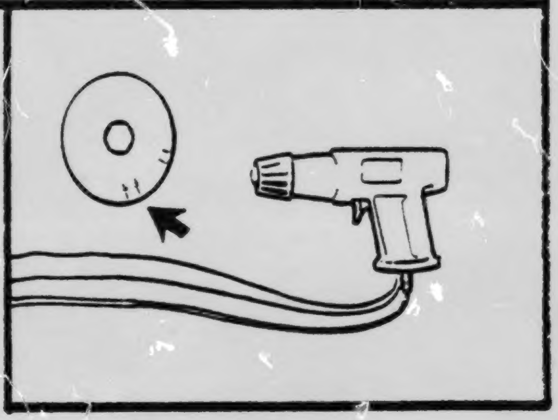
LOOK:

24. HOOK-UP THE POWER LEADS FROM THE TIMING LIGHT TO A BATTERY OF THE RIGHT VOLTAGE.



25. START THE ENGINE.

26. PULL THE TIMING LIGHT TRIGGER AND POINT IT AT THE ROTOR. LOOK AT THE "F" LINE. IF IT DOES NOT ALIGN WITH THE NON-MOVING LINE, THE TIMING IS OFF.

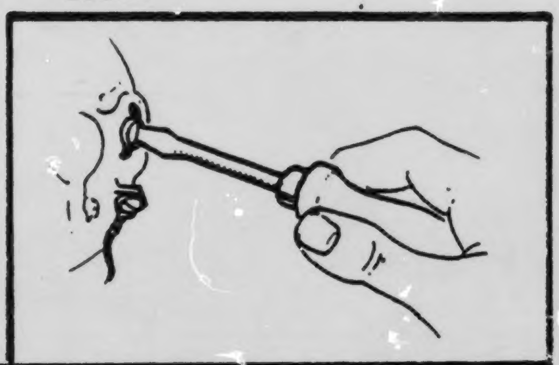


"TURN THE PAGE"

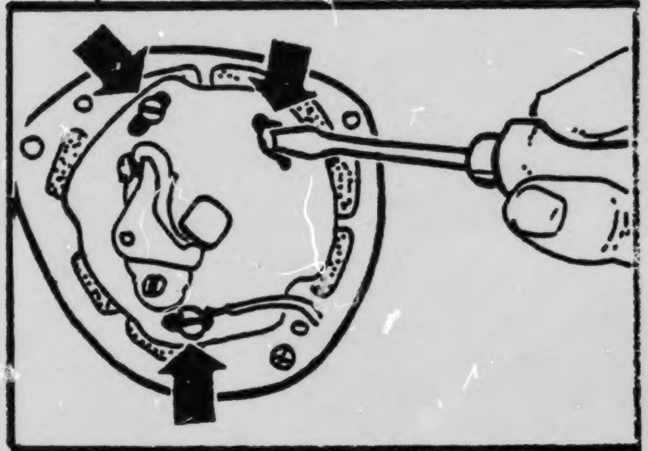
JOB STEPS

READ: LOOK:

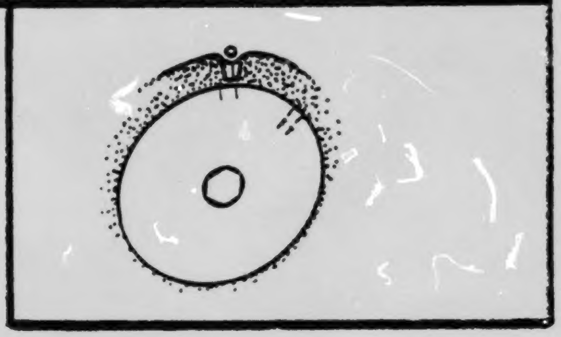
27. IF THE TIMING IS OFF, USE A SCREWDRIVER TO LOOSEN THE POINTS BACKING PLATE. TURN THE BACKING PLATE TO THE RIGHT OR TO THE LEFT UNTIL THE TIMING MARKS LINE UP RIGHT.



28. TIGHTEN THE BACKING PLATE SCREWS.



29. SPEED UP THE ENGINE UNTIL THE TWO UNMARKED LINES ALIGN WITH THE NON-MOVING LINE.



30. POINT THE TIMING LIGHT AT THE ROTOR TO CHECK. AT ABOUT 4,000 RPM, THE LINES SHOULD LINE UP. IF NOT, SET THE TIMING LIKE YOU DID IN JOB STEP 26 AND 27. THEN, SHUT OFF THE ENGINE.

NOTE: OIL WILL SPRAY AROUND, SO BE READY WITH RAGS.

CHECK: WHEN THE TIMING IS SET RIGHT, ASK YOUR INSTRUCTOR TO CHECK IT WITH YOU.

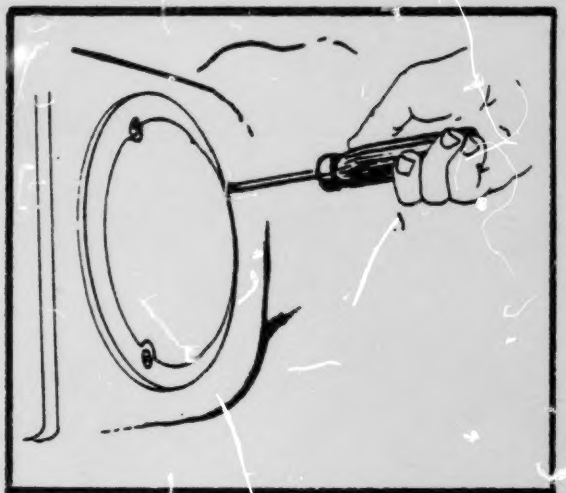
"TURN THE PAGE"

JOB STEPS

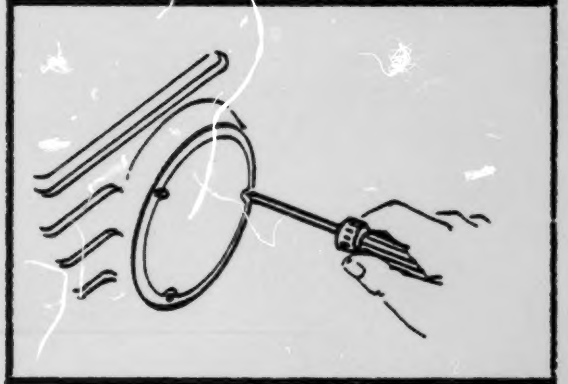
READ: LOOK:

31. REMOVE THE TIMING LIGHT LEADS.

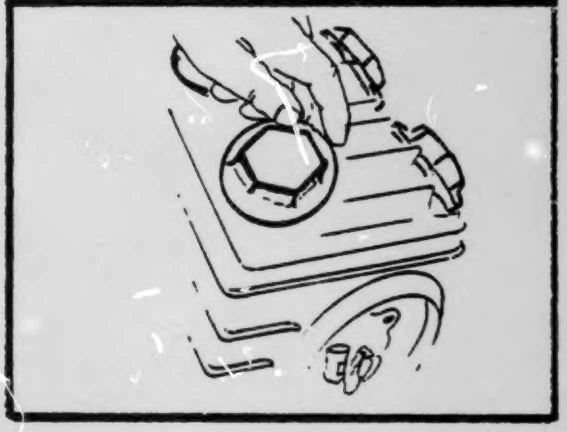
32. USING A SCREWDRIVER, PUT THE ALTERNATOR COVER BACK ON. →



33. USING A SCREWDRIVER, PUT THE POINTS COVER PLATE BACK ON. →



34. USING A WRENCH, PUT THE ROCKER COVERS BACK ON. →



CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

1. REMOVED THE TIMING LIGHT.
2. CHECKED THE ADVANCE TIMING WITH THE TIMING LIGHT.
3. PUT ON THE ALTERNATOR AND POINTS COVERS.
4. PUT ON THE ROCKER COVERS.

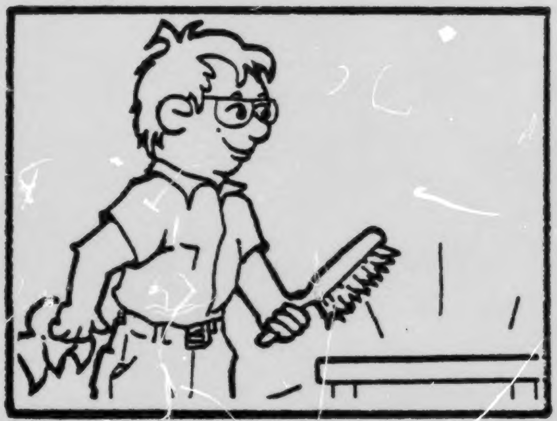
"TURN THE PAGE"

JOB STEPS

READ:

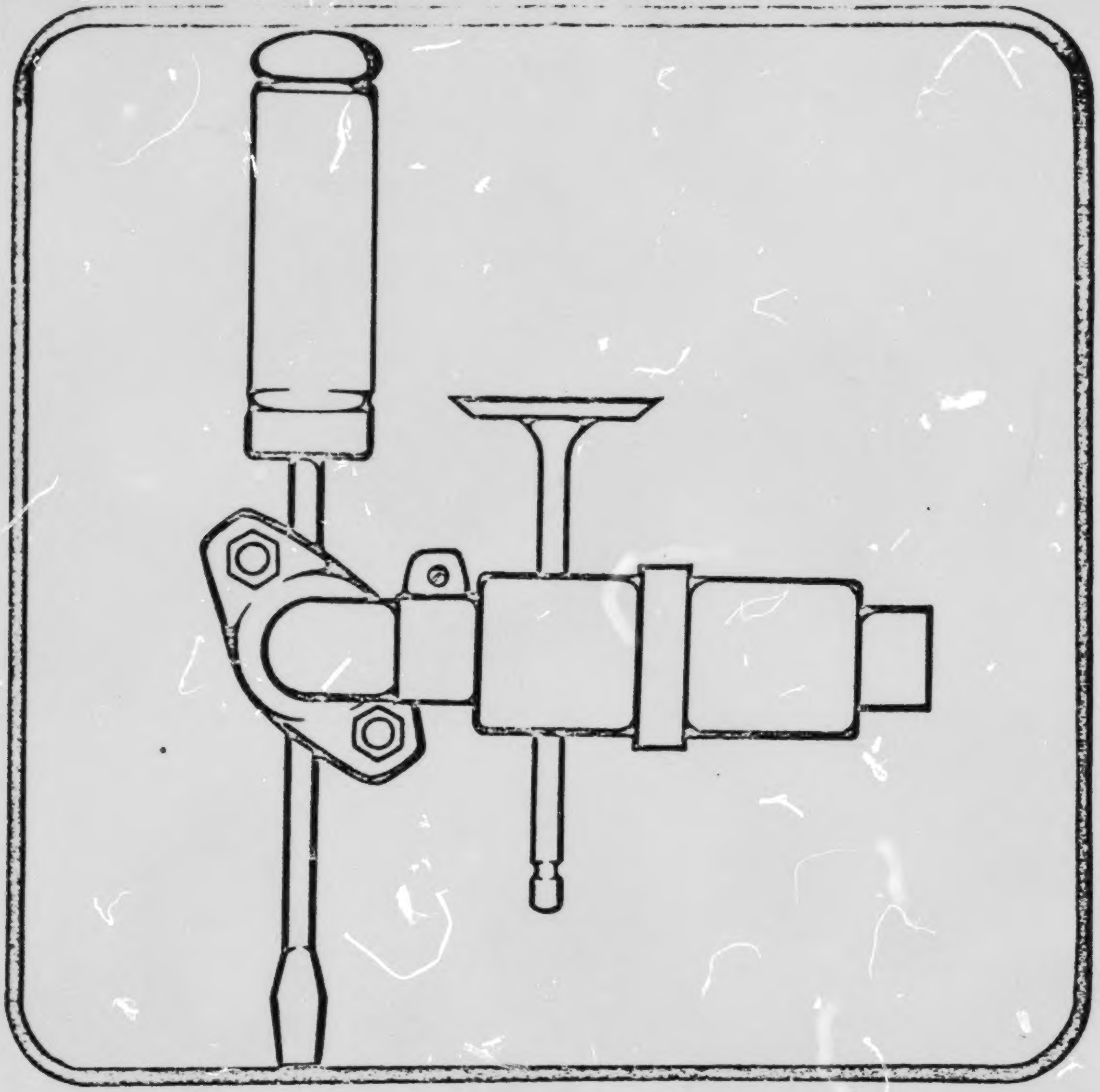
35. CLEAN UP YOUR WORK AREA AND PUT AWAY ALL THE TOOLS AND EQUIPMENT.

LOOK:



CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

1. CLEANED UP YOUR WORK AREA.
2. PUT AWAY ALL THE TOOLS AND EQUIPMENT.



small engine repair

unit: ENGINE REMOVAL AND REPLACEMENT

capital area career center

module: 7501 15 001 1
7501 15 001 3 **date:** SEPTEMBER 1977 **level:** IV

skill title: REMOVE AND REPLACE ENGINE: ALIGN TO DRIVE TRAIN

developed & written by: JIM PITTS AND DWIGHT SMITH

visuals by: DAVE WEHRWEIN & BRUCE BENNETT

WORD GUIDE

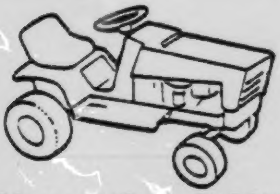
ALIGN - SET IN RIGHT PLACE
REMOVE - TAKE OFF
REPLACE - CHANGE OR PUT BACK
MOUNTED - PUT ONTO

PERFORMANCE OBJECTIVE

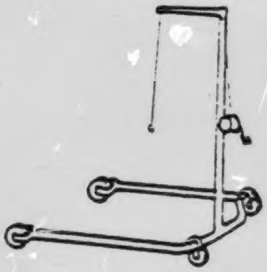
YOU ARE GOING TO LEARN:

HOW TO REMOVE AND REPLACE AN ENGINE.
HOW TO ALIGN THE ENGINE AND ATTACH IT TO THE DRIVE TRAIN.

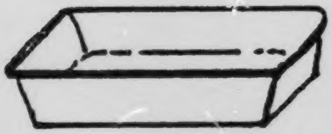
AND IN ORDER TO DO THIS YOU WILL NEED:



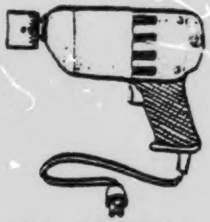
2 OR 4-CYCLE ENGINE,
MOUNTED TO A MACHINE
THAT RUNS



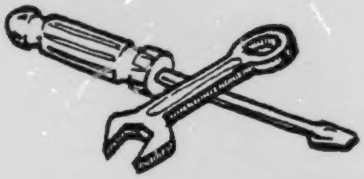
ENGINE HOIST



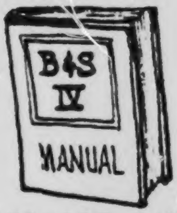
DRAIN PAN



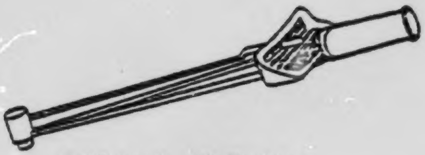
AIR WRENCH



HAND TOOLS



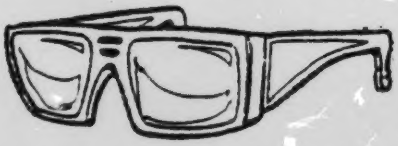
SERVICE MANUAL



TORQUE WRENCH

MOD 7501 15 007 1
7501 15 007 3

CHALK OR OTHER MARKER



SAFETY GLASSES

"TURN THE PAGE"

→

WORD GUIDE

GUIDELINES - RULES

WE WILL KNOW THAT YOU CAN DO IT WHEN:

1. YOU HAVE THE EQUIPMENT FOR THIS MOD.
2. YOU HAVE REMOVED AND REPLACED THE ENGINE.
3. YOU HAVE ATTACHED AND ALIGNED THE ENGINE TO THE DRIVE TRAIN.
4. THE MACHINE OPERATES ACCORDING TO THE SERVICE MANUAL GUIDELINES.

"TURN THE PAGE"

WORD GUIDE 4

DRAIN - TO EMPTY, CLEAN OUT

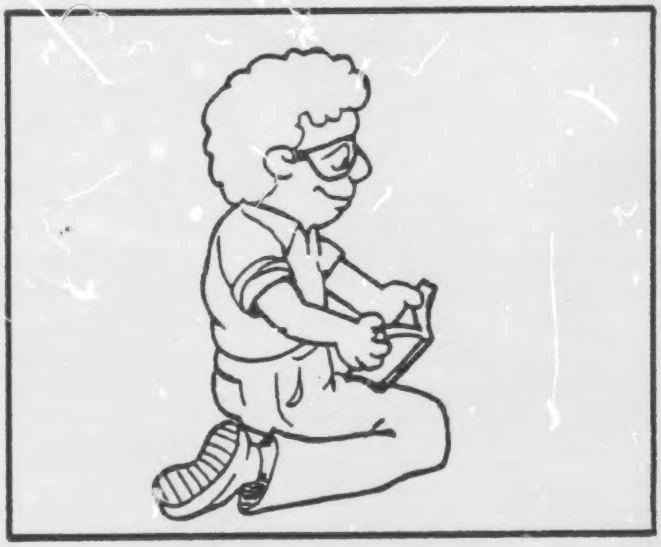
JOB STEPS

READ:

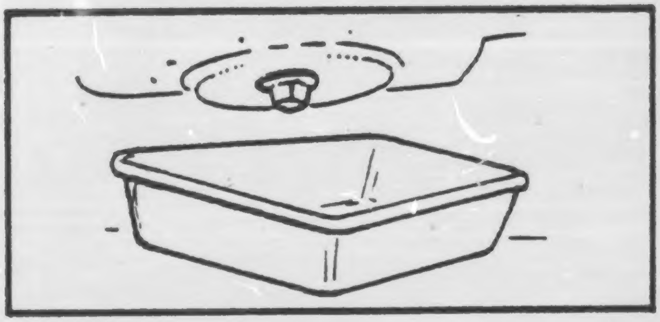
LOOK:

1. TAKE ALL EQUIPMENT TO YOUR WORK AREA.

2. FIND THE RIGHT SERVICE MANUAL FOR THE ENGINE ON WHICH YOU WILL WORK. READ ABOUT REMOVING YOUR ENGINE. WEAR YOUR SAFETY GLASSES. →



3. USE A WRENCH AND DRAIN PAN TO DRAIN THE OIL FROM THE ENGINE. →



CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

1. ALL THE EQUIPMENT FOR THIS MOD.
2. THE RIGHT SERVICE MANUAL FOR THE ENGINE.
3. READ ABOUT REMOVING THE ENGINE.
4. DRAINED THE ENGINE OIL.

"TURN THE PAGE"

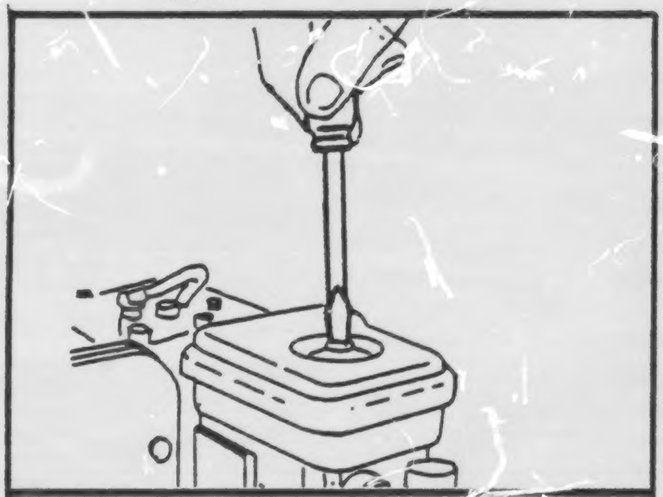
WORD GUIDE

UNHOOK - TAKE OFF

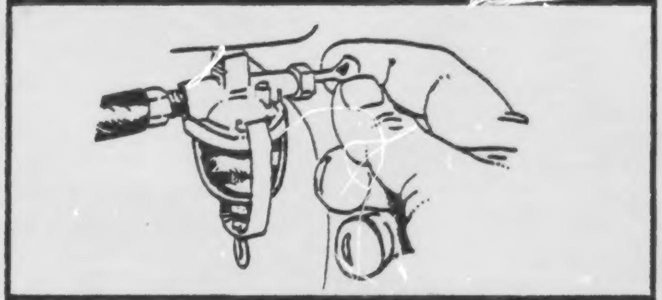
JOB STEPS

READ: LOOK:

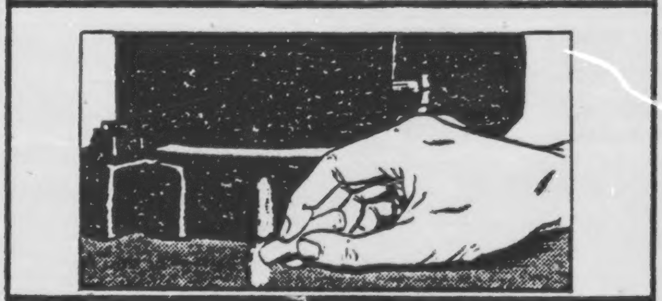
4. USE A WRENCH OR SCREWDRIVER TO REMOVE THE AIR CLEANER.



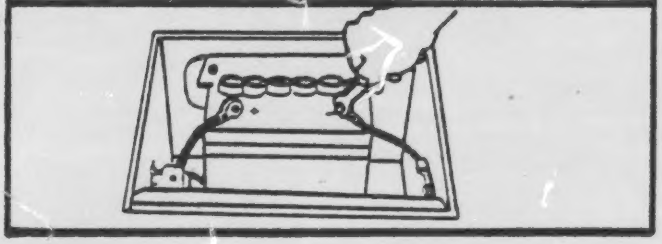
5. DRAIN OR SHUT OFF THE GAS SUPPLY.



6. USE SOME CHALK OR OTHER MARKER TO MARK THE ENGINE MOUNTING AND ALIGNMENT ON THE BLOCK AND FRAME.



7. IF MACHINE HAS AN ELECTRIC START, UNHOOK THE BATTERY.



CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

1. REMOVED THE AIR CLEANER.
2. SHUT OFF OR DRAINED THE GAS SUPPLY.
3. MARKED WHERE THE ENGINE LINES UP WITH THE MACHINE FRAME.
4. UN-HOOKED THE ELECTRICAL WIRES.

"TURN THE PAGE"

WORD GUIDE

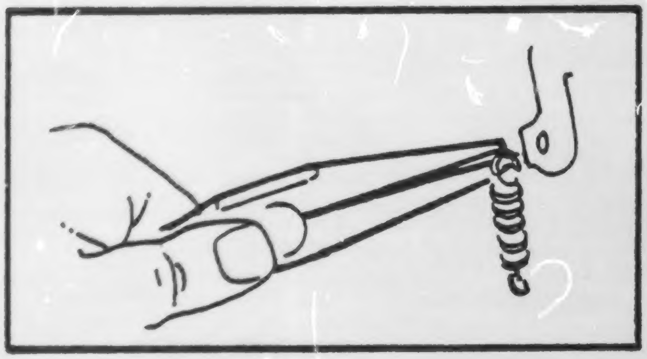
CAREFULLY - WITH CARE

JOB STEPS

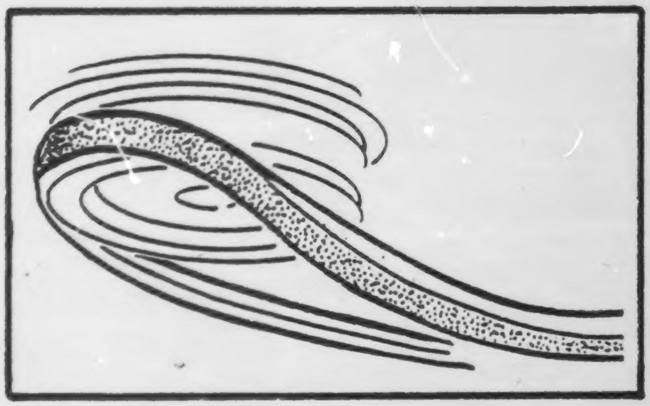
READ:

LOOK:

8. USE PLIERS TO UNHOOK THE THROTTLE AND CHOKE CONTROLS.



9. USE A SCREWDRIVER TO REMOVE ANY BELT GUARD OR COVER. LOOK AT THE SCREWS TO SEE WHERE TO PUT EACH ONE BACK.



10. REMOVE ANY DRIVE BELTS. BE SURE TO LOOK AT THE DRIVE SET-UP CAREFULLY, SO YOU CAN REPLACE IT RIGHT.

CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

1. REMOVED THE THROTTLE AND CHOKE.
2. REMOVED THE BELT GUARD.
3. REMOVED THE DRIVE BELT.

"TURN THE PAGE"

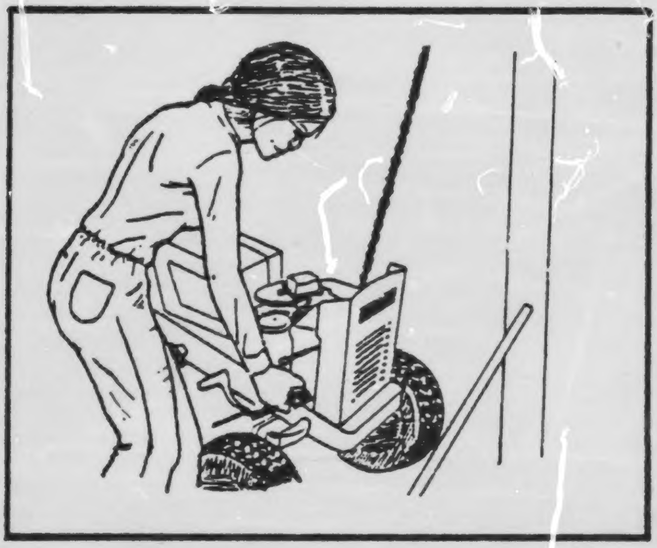
JOB STEPS

READ: LOOK:

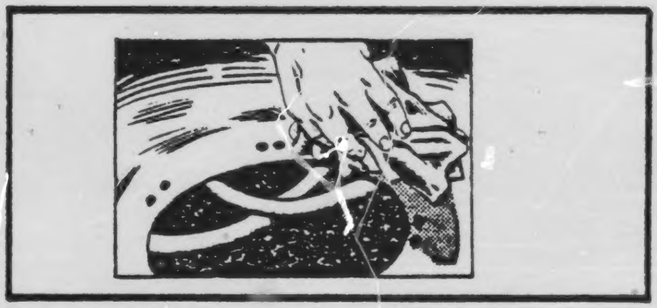
11. USE THE AIR WRENCH AND SOCKET SET TO REMOVE THE MOUNTING BOLTS.

12. REMOVE ENGINE FROM FRAME.

NOTE: IF THE ENGINE IS HEAVY, USE A WINCH OR CHAIN FALL.



13. CLEAN UP THE ENGINE MOUNTS AND FRAME (WHERE THE ENGINE IS MOUNTED).



CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

1. REMOVED THE MOUNTING BOLTS.
2. REMOVED THE ENGINE.
3. CLEANED UP THE FRAME AND MOUNTING AREA.

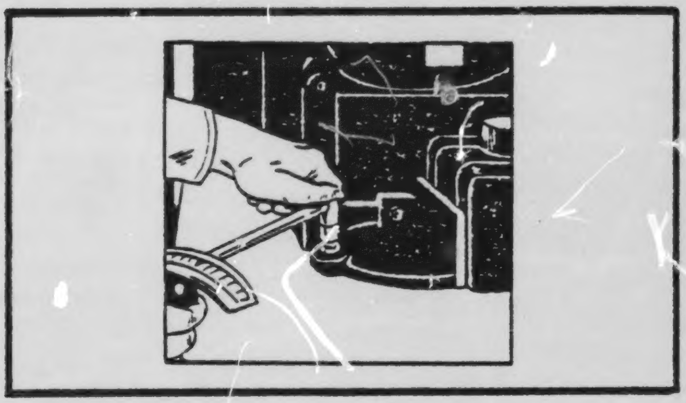
"TURN THE PAGE"

JOB STEPS

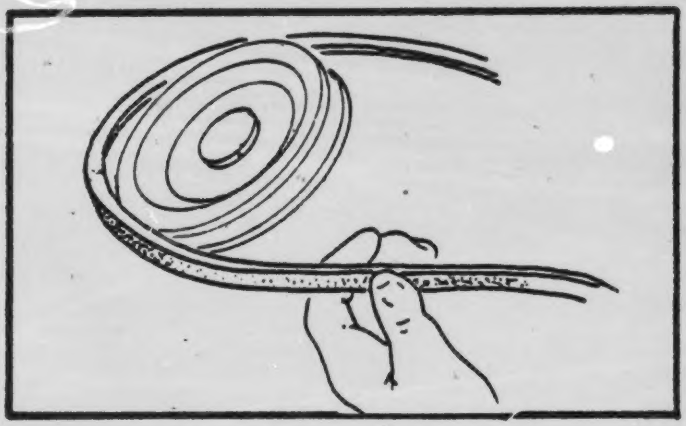
READ: LOOK:

14. SET THE ENGINE IN PLACE AND LINE UP YOUR MARKS. ASK FOR HELP IF YOU NEED IT.

15. PUT IN THE MOUNTING BOLTS AND TORQUE DOWN TO RIGHT GUIDELINES.



16. PUT THE BELT ON AND ALIGN.



CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

1. PUT THE ENGINE BACK IN THE RIGHT WAY.
2. ALIGNED THE MOUNTING MARKS AND PUT IN THE BOLTS.
3. PUT ON AND ALIGNED THE BELT RIGHT.

"TURN THE PAGE"

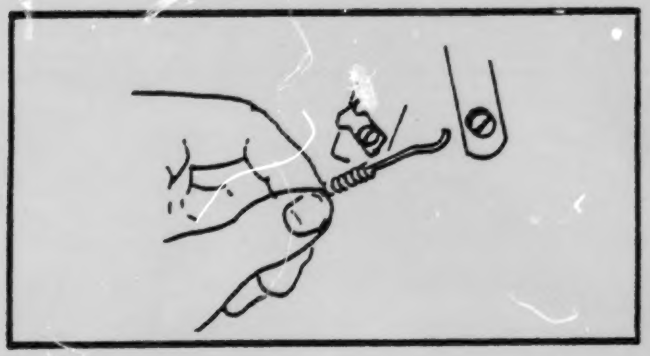
JOB STEPS

READ: LOOK:

17. PUT ON BELT GUARDS.

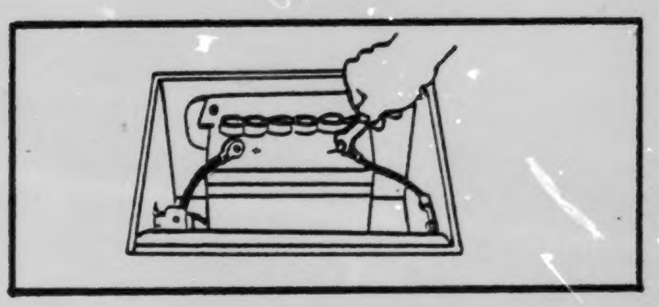
18. HOOK-UP THE THROTTLE AND CHOKE CONTROLS. CHECK TO SEE THAT THEY BOTH WORK. SEE MOD 7501 15 007 1
7501 15 007 3 IF YOU HAVE ANY QUESTIONS.

→



19. HOOK-UP BATTERY AND/OR WIRING.

→



CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

1. PUT ON THE BELT GUARDS.
2. HOOKED UP THE THROTTLE AND CHOKE RIGHT.
3. HOOKED UP THE WIRING OR BATTERY.

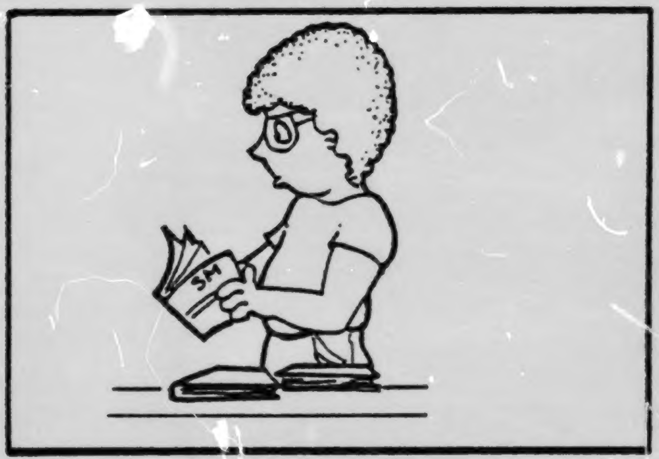
"TURN THE PAGE"

JOB STEPS

READ:

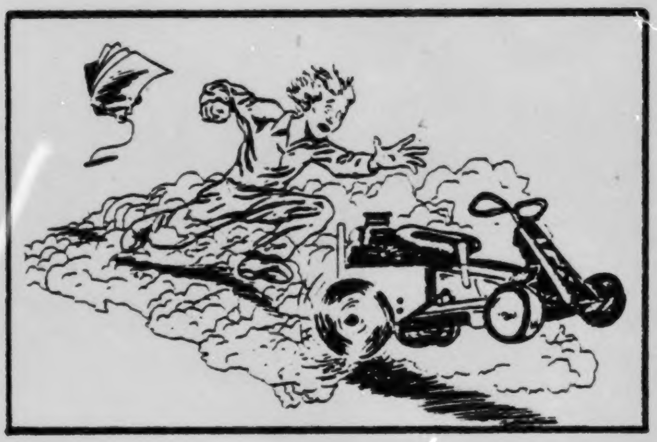
LOOK:

20. FILL THE CRANKCASE WITH THE RIGHT OIL (CHECK SERVICE MANUAL). →



21. PUT GAS IN THE TANK OR TURN ON THE ENGINE.

22. LIFT DRIVE END OF MACHINE SO IT DOES NOT MOVE WHEN STARTED. →



CHECK: ASK YOUR INSTRUCTOR TO CHECK YOUR WORK. YOUR INSTRUCTOR WILL CHECK:

1. THAT YOU FILLED THE CRANKCASE WITH OIL.
2. THAT THE FUEL TANK HAS GAS INSIDE.
3. THAT YOU LIFTED UP THE DRIVE END OF THE MACHINE.

"TURN THE PAGE"

WORD GUIDE

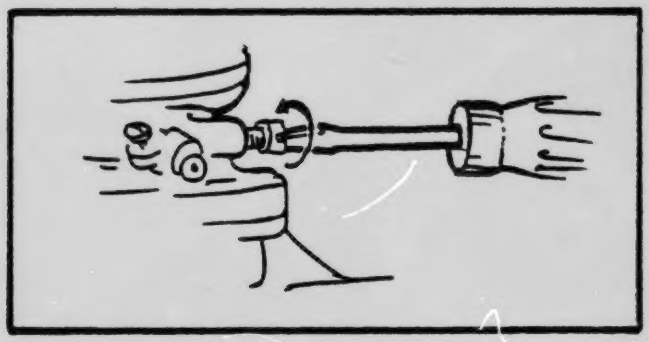
IDLE - SETS SPEED OF ENGINE WHEN ENGINE IS NOT MOVING

JOB STEPS

READ: LOOK:

23. START THE ENGINE. CHECK HOW IT WORKS.

24. SET THE IDLE SO THAT THE WHEEL OR TRACK STOPS WHEN IDLING. →



25. SHUT OFF THE ENGINE.

CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

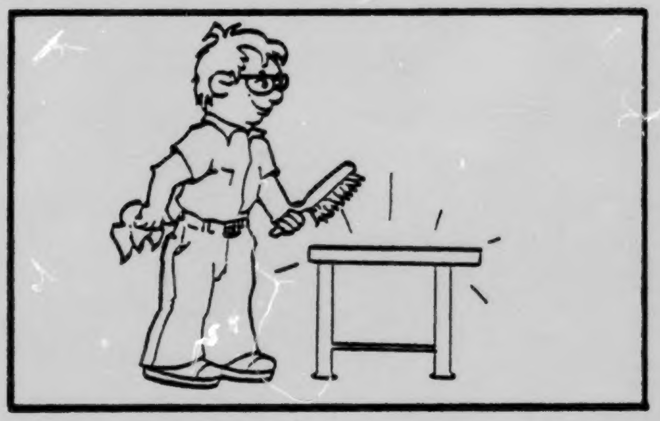
1. STARTED THE ENGINE.
2. SET THE IDLE RIGHT.

"TURN THE PAGE"

READ: JOB STEPS

26. CLEAN UP THE MACHINE FOR CUSTOMER PICK-UP. CLEAN UP THE WORK AREA AND RETURN ALL TOOLS AND EQUIPMENT.

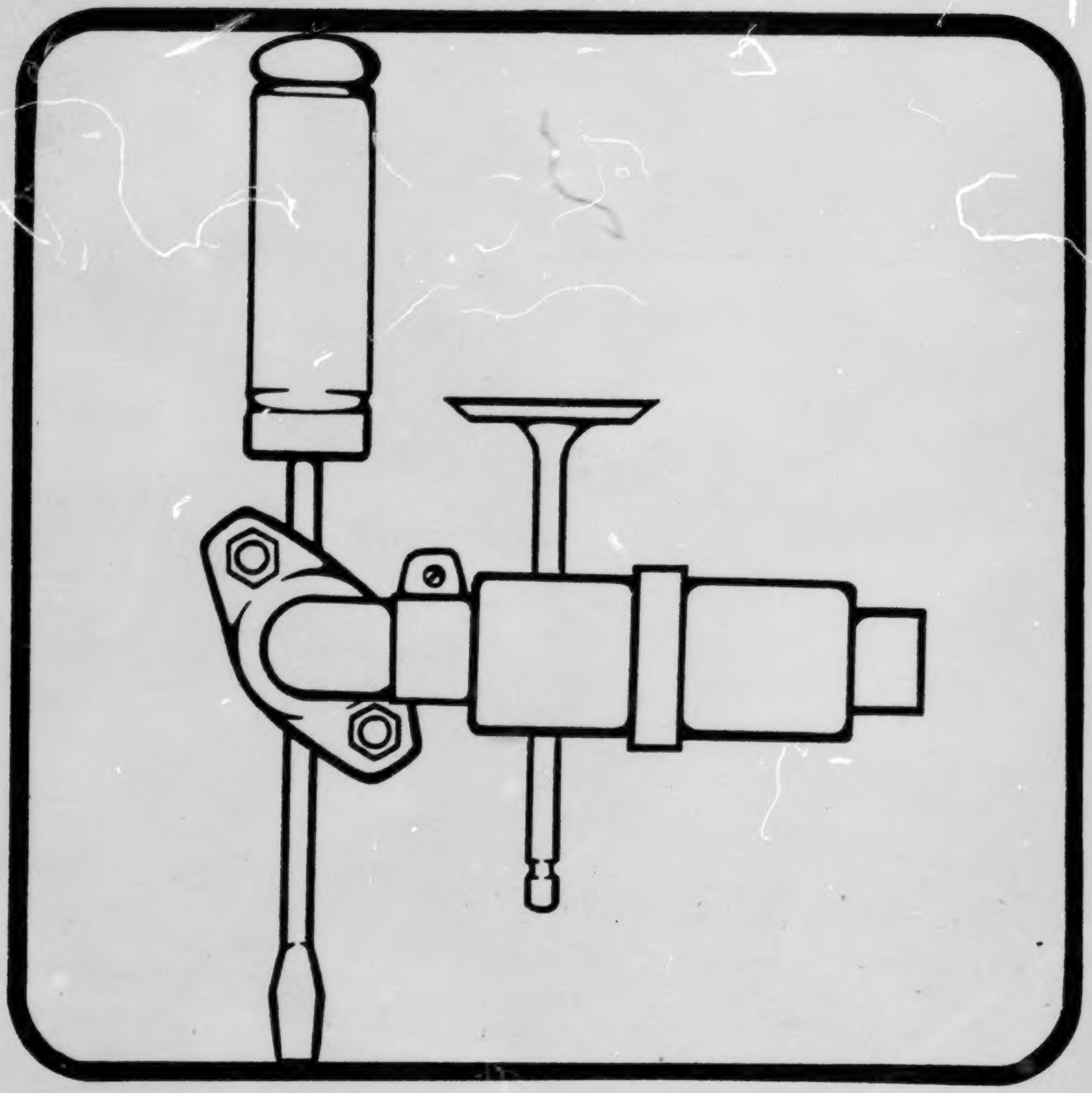
LOOK:



WORD GUIDE

CUSTOMER - PERSON FOR WHOM YOU DO THE WORK

CHECK: ASK YOUR INSTRUCTOR TO CHECK YOUR WORK.



small engine repair

unit: ENGINE REMOVAL AND REPLACEMENT

capital area career center

module: 7501 15 002 1
7501 15 002 3 **date:** OCTOBER 1977 **level:** IV

skill title: REMOVE AND REPLACE ENGINE ON PUSH MOWER

developed & written by: DEBI WHITE

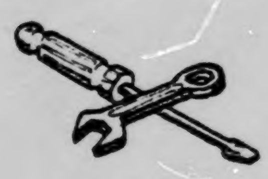
visuals by: DAVE WEHRWEIN AND BRUCE BENNETT

PERFORMANCE OBJECTIVE

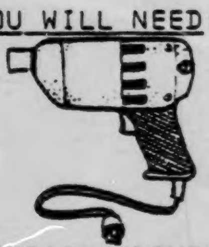
YOU ARE GOING TO LEARN:

HOW TO TAKE THE ENGINE OUT OF A PUSH LAWN MOWER AND PUT IT BACK IN.

AND IN ORDER TO DO THIS YOU WILL NEED:

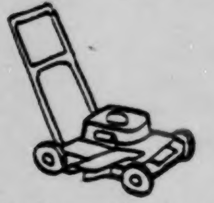


HAND TOOLS



IMPACT WRENCH

SERVICE MANUAL



PUSH TYPE LAWN MOWER
WITH ENGINE

SAFETY GLASSES

WE WILL KNOW YOU CAN DO IT WHEN:

YOU READ THE MODULE.

YOU GET YOUR EQUIPMENT.

YOU DO THE JOB STEPS TO REMOVE AND REPLACE AN ENGINE IN A PUSH LAWN MOWER.

YOU HAVE CLEANED YOUR WORK AREA AND PUT YOUR TOOLS AWAY.

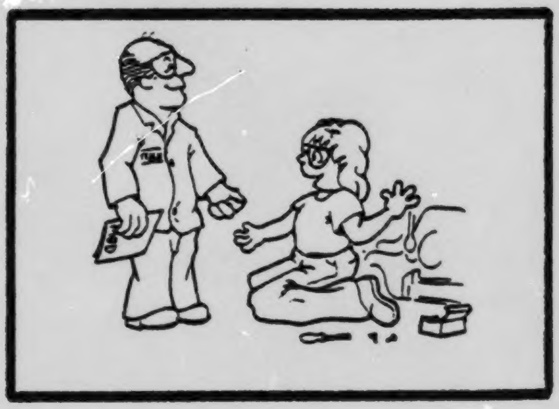
"TURN THE PAGE"

JOB STEPS

READ: LOOK:

1. ASK YOU INSTRUCTOR WHICH PUSH TYPE LAWN MOWER YOU SHOULD WORK ON. GET THE SERVICE MANUAL FOR THE LAWN MOWER.

NOTE: YOU WILL CHANGE THE ENGINES ON MOWERS MANY TIMES. ALWAYS GET THE SERVICE MANUAL FOR THE LAWN MOWER YOU ARE WORKING ON.

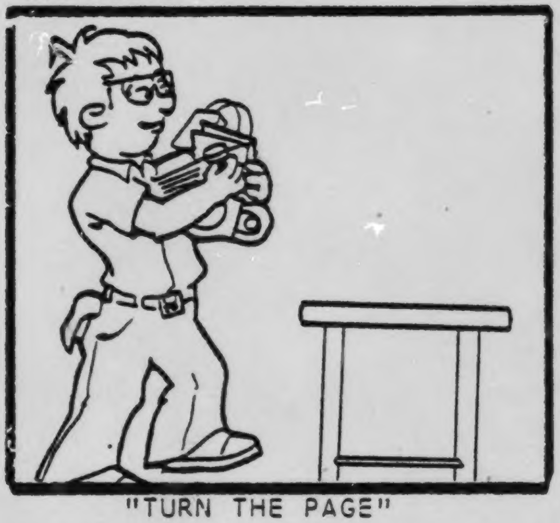


2. FIND THESE 3 THINGS BEFORE YOU START WORK:

OIL DRAIN PLUG
ENGINE MOUNT BOLTS
THE THROTTLE AND CHOKE HOOK-UP.

CHECK: SHOW THE 3 THINGS TO YOUR INSTRUCTOR.

3. TAKE ALL EQUIPMENT TO YOUR WORK AREA.



"TURN THE PAGE"

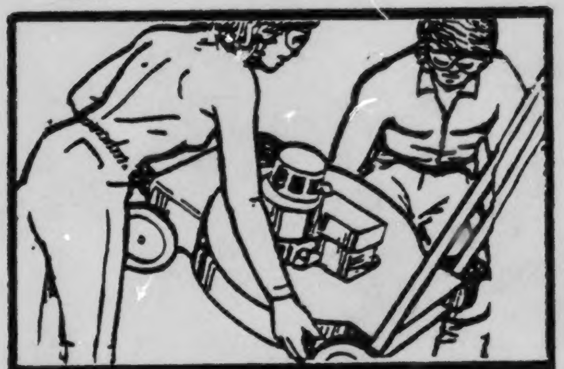
WORD GUIDE

TILT - LEAN TO ONE SIDE.

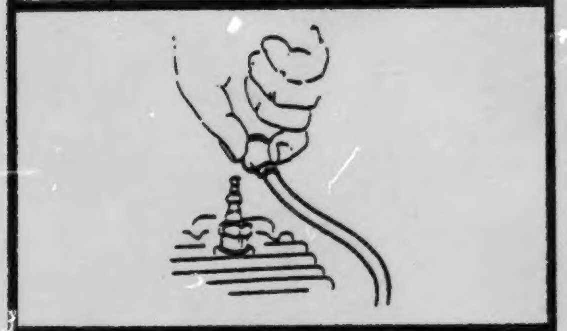
JOB STEPS

READ: LOOK:

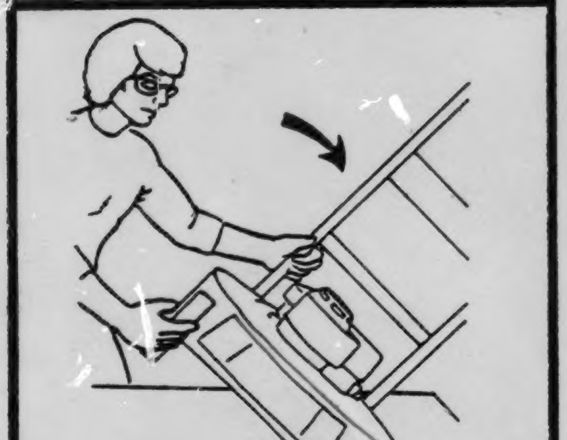
4. PUT MOWER ON THE WORK BENCH. GET HELP. WEAR YOUR SAFETY GLASSES.



5. REMOVE THE SPARK PLUG WIRE FROM PLUG.



6. TILT MOWER TO ONE SIDE SO THAT THE VALVE BREATHER ASSEMBLY IS UP. THIS WILL KEEP OIL FROM DRAINING ONTO THE HEAD.



CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

1. PUT MOWER ON BENCH.
2. REMOVED SPARK PLUG WIRE.
3. TILTED MOWER SO THAT VALVE CHAMBER BREATHER IS UP.

"TURN THE PAGE"

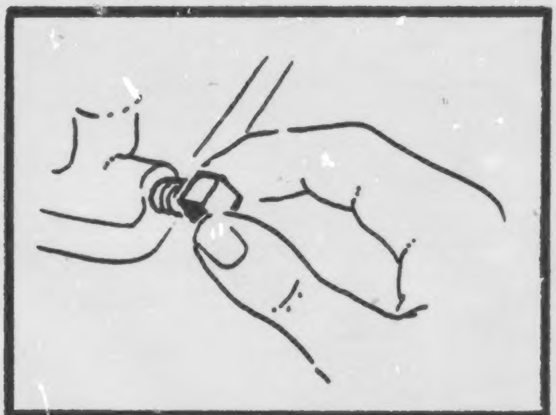
WORD GUIDE

REMOVE - TAKE OFF; TAKE OUT.

JOB STEPS

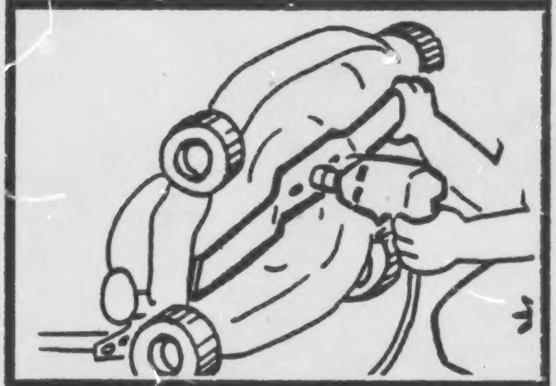
READ: LOOK:

7. DRAIN ENGINE OIL.

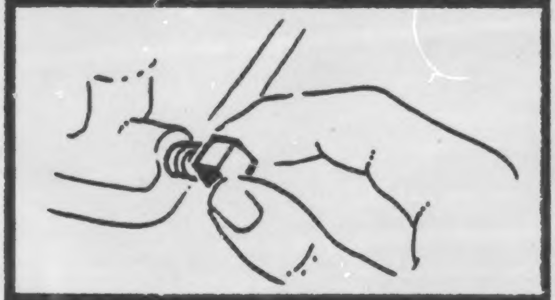


8. AS THE OIL IS DRAINING, USE THE IMPACT WRENCH TO REMOVE THE BLADE NUT.

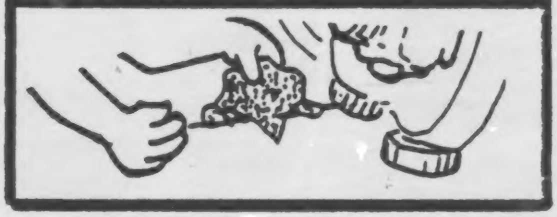
NOTE: LOOK AT HOW BLADE HUB AND WASHERS ARE INSTALLED SO YOU KNOW HOW TO REPLACE THEM.



9. PUT OIL DRAIN PLUG BACK IN. REMOVE OIL DRAIN PAN.



10. WIPE UP ANY SPILLS.



"TURN THE PAGE"

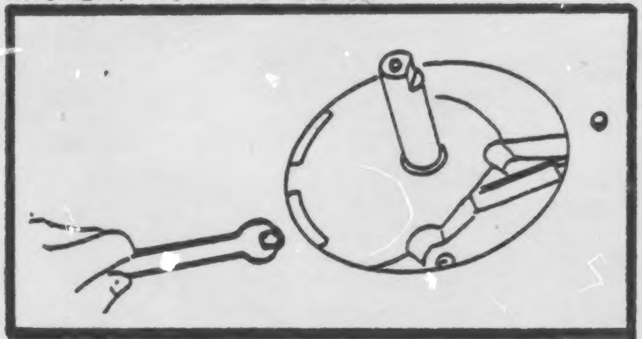
JOB STEPS

READ: LOOK:

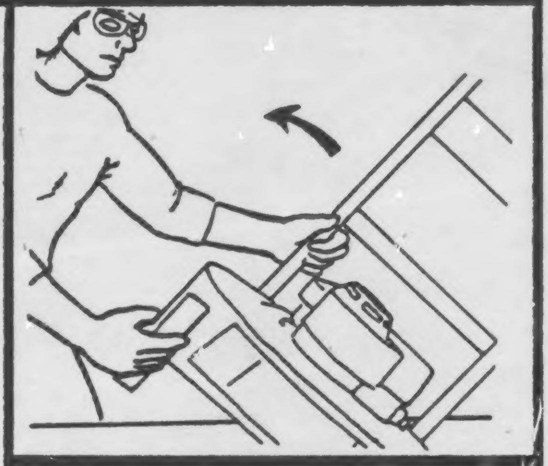
CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

1. DRAINED OIL AND REPLACED PLUG.
2. REMOVED MOWER BLADE.
3. SET ASIDE BLADE WASHER, NUT AND BLADE.

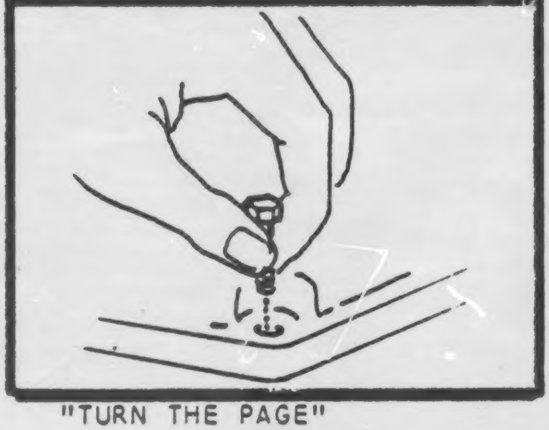
11. REMOVE ENGINE MOUNTING BOLTS--LEAVE 1 BOLT ON.



12. TIP MOWER BACK UPRIGHT ON THE BENCH.



13. TAKE OFF THE LAST MOUNTING BOLT AND NUT.

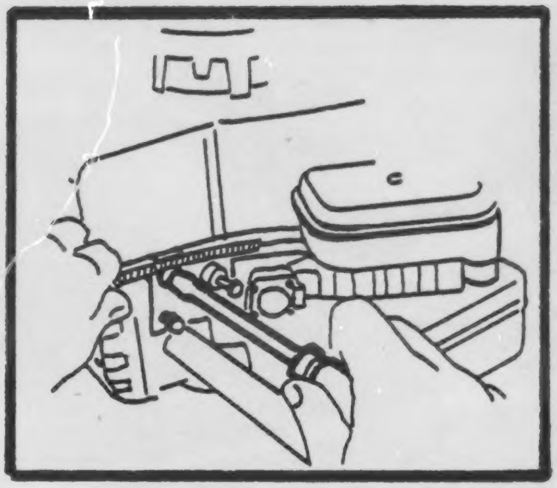


"TURN THE PAGE"

JOB STEPS

READ: LOOK:

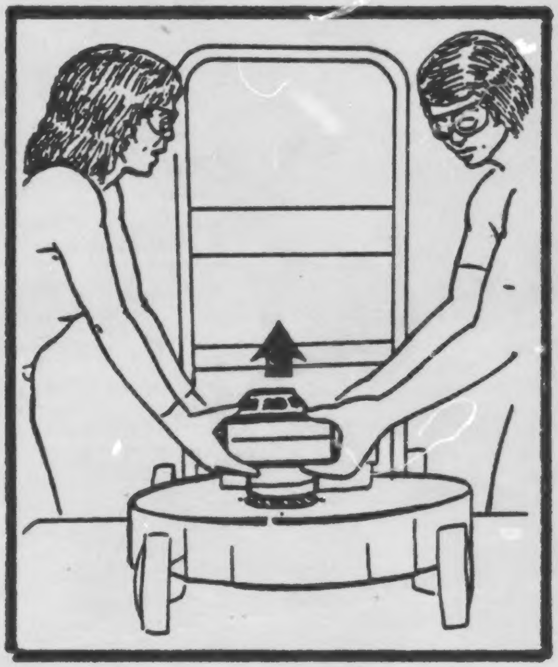
14. REMOVE ANY THROTTLE CONTROL CABLES OR STARTER CONTROL CABLES. →



CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

1. REMOVED ALL ENGINE BOLTS.
2. REMOVED ANY THROTTLE CONTROL OR STARTER CONTROL CABLES.

15. LIFT THE ENGINE OFF THE MOWER. GET HELP IF NEEDED. →



16. DO ANY NEEDED REPAIRS.

CHECK: ASK YOUR INSTRUCTOR TO CHECK YOUR WORK.

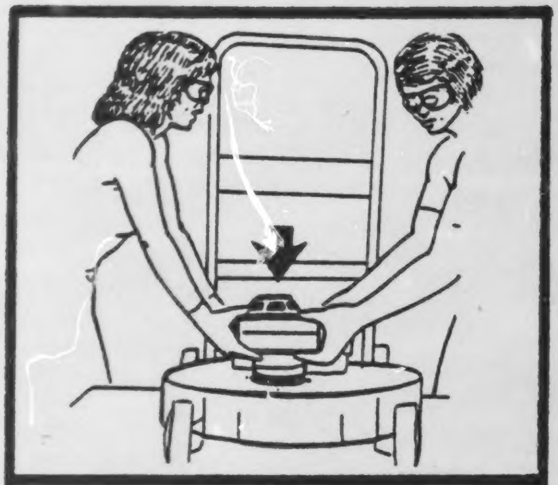
"TURN THE PAGE"

JOB STEPS

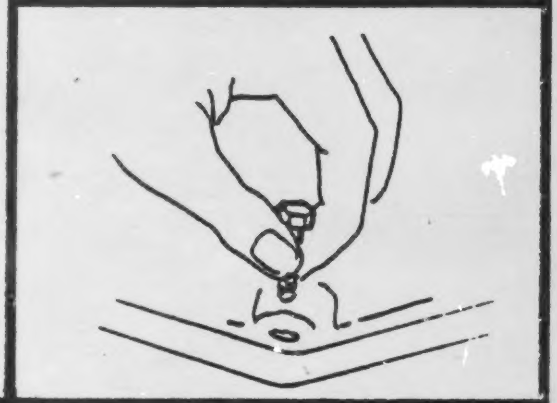
READ:

LOOK:

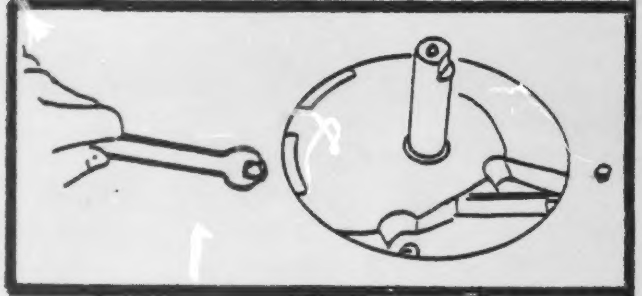
17. PUT THE ENGINE BACK ON THE MOWER.



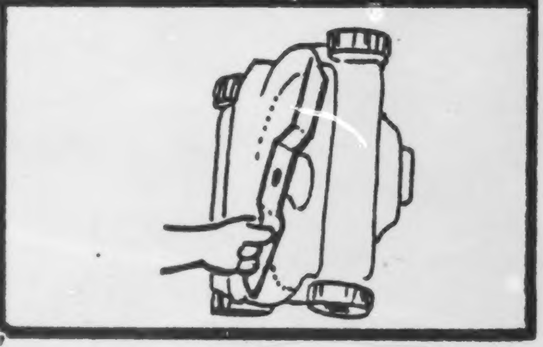
18. PUT ONE MOUNTING BOLT THROUGH THE ENGINE AND MOWER. PUT THE NUT ON--NOT TOO TIGHT.



19. TILT MOWER ON SIDE. PUT THE OTHER MOUNTING BOLTS IN. LEAVE THE BOLTS LOOSE.



20. CHECK THE BLADE. IS IT SHARP AND BALANCED?



CHECK: IF THE BLADE IS NOT SHARP,

ASK YOUR INSTRUCTOR IF YOU SHOULD SHARPEN THE BLADE AS IN MODULE 7501 11 001.

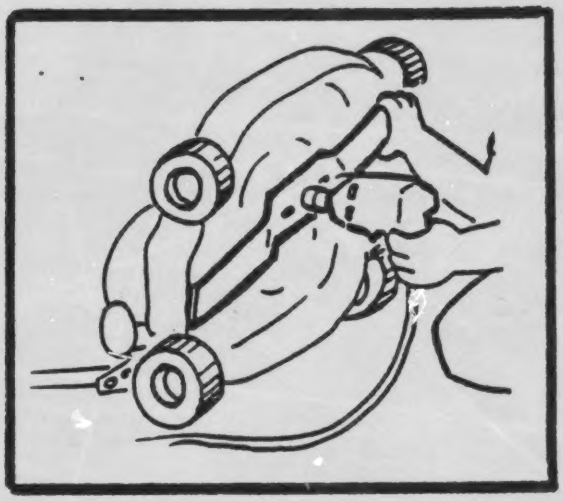
"TURN THE PAGE"

JOB STEPS

READ: LOOK:

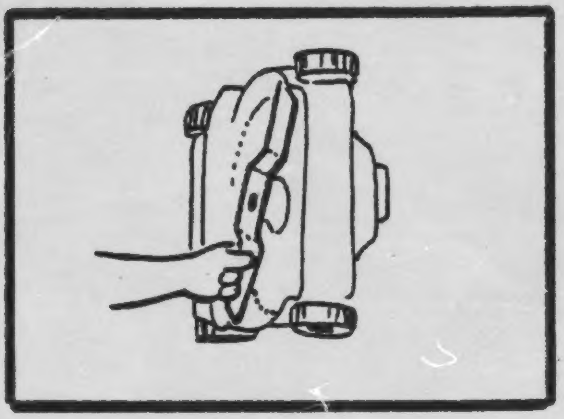
21. PUT THE BLADE AND HUB ASSEMBLY BACK ON.

22. USE YOUR IMPACT WRENCH AND TIGHTEN THE BLADE NUT AND WASHERS. LET THE WRENCH HAMMER 5 OR 6 TIMES.



23. CHECK THE BLADE. TURN THE BLADE AROUND--IF IT TOUCHES THE MOWER, MOVE THE ENGINE AWAY FROM WHERE IT TOUCHES.

24. TURN THE BLADE AGAIN TO BE SURE IT DOES NOT TOUCH THE MOWER. NOW, TIGHTEN THE BOLTS.



CHECK: ASK YOUR INSTRUCTOR TO DOUBLE CHECK YOUR BLADE.

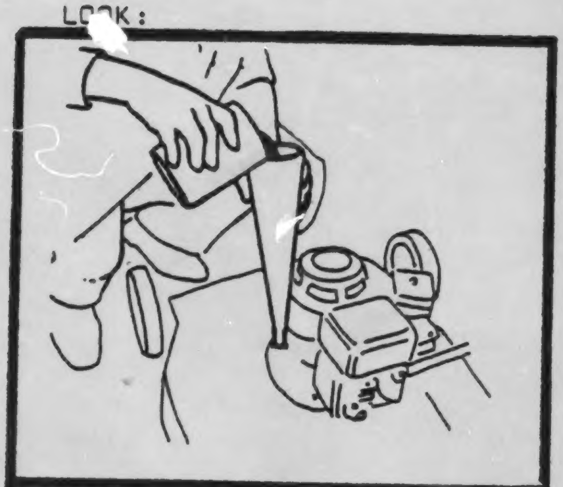
TIP THE MOWER DOWN IF THE BLADE IS OKAY.

"TURN THE PAGE"

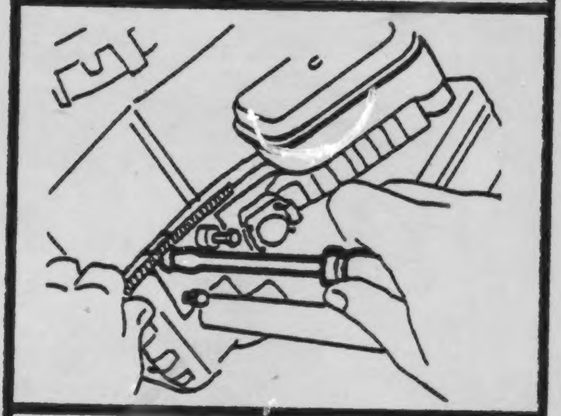
JOB STEPS

READ: LOOK:

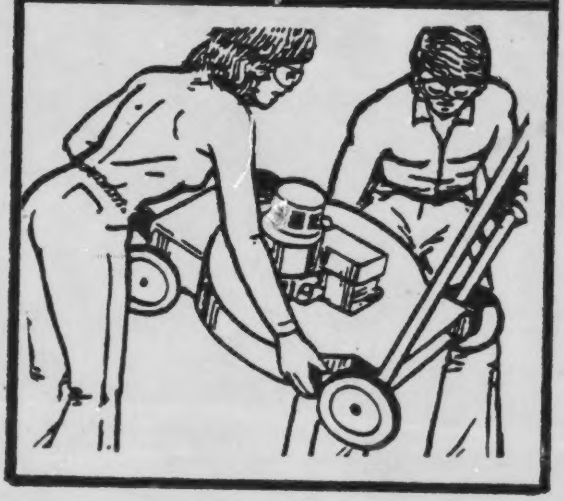
25. PUT OIL BACK IN THE MOWER. →



26. HOOK UP ANY THROTTLE OR STARTER CONTROL CABLES. →



27. PUT MOWER [illegible] FLOOR. GET HELP. →

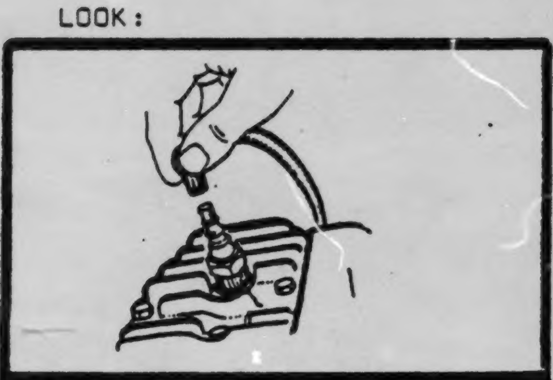


"TURN THE PAGE"

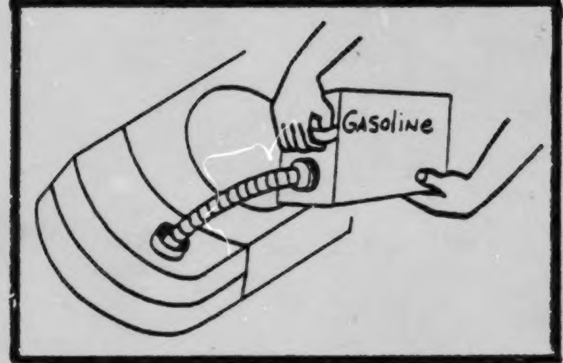
JOB STEPS

READ: LOOK:

28. HOOK UP THE SPARK PLUG WIRE. →



29. BE SURE THERE IS FUEL IN THE TANK. →

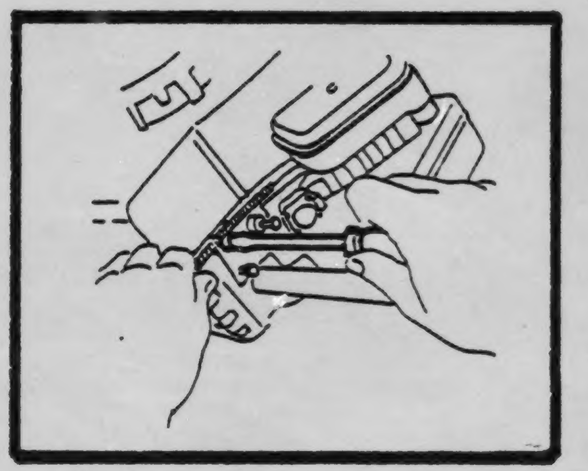


CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

1. PUT OIL IN THE ENGINE.
2. HOOKED UP ANY THROTTLE AND STARTER CONTROL CABLES.
3. PUT MOWER ON THE FLOOR.
4. HOOKED UP THE SPARK PLUG WIRE.

30. ASK YOUR INSTRUCTOR IF IT IS O.K. TO START THE MOWER.

31. ADJUST THE THROTTLE AND CHOKE. ASK YOU INSTRUCTOR TO WATCH YOU. →



"TURN THE PAGE"

JOB STEPS

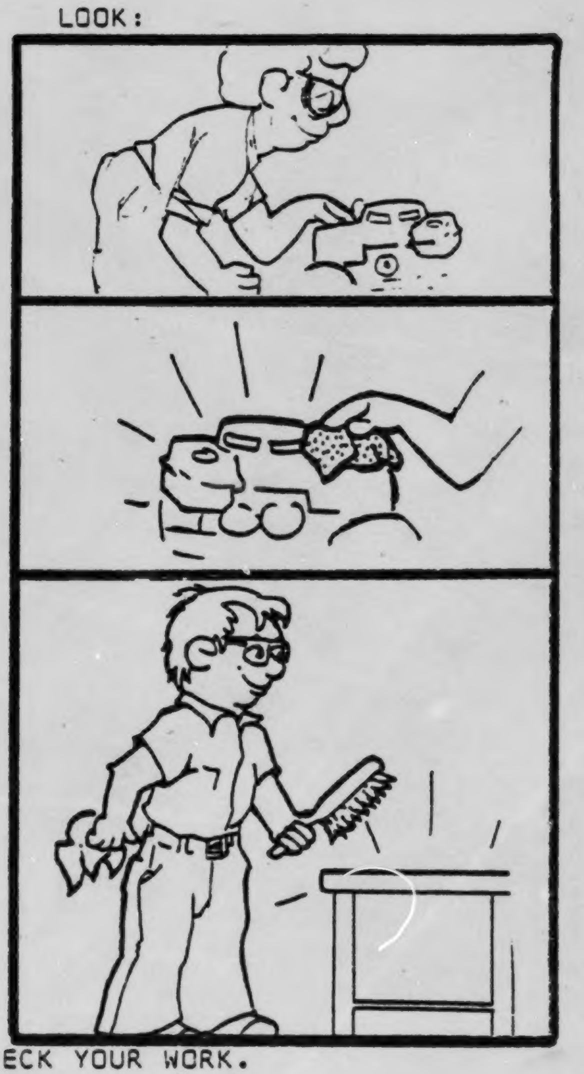
READ:

32. TURN OFF THE MOWER.

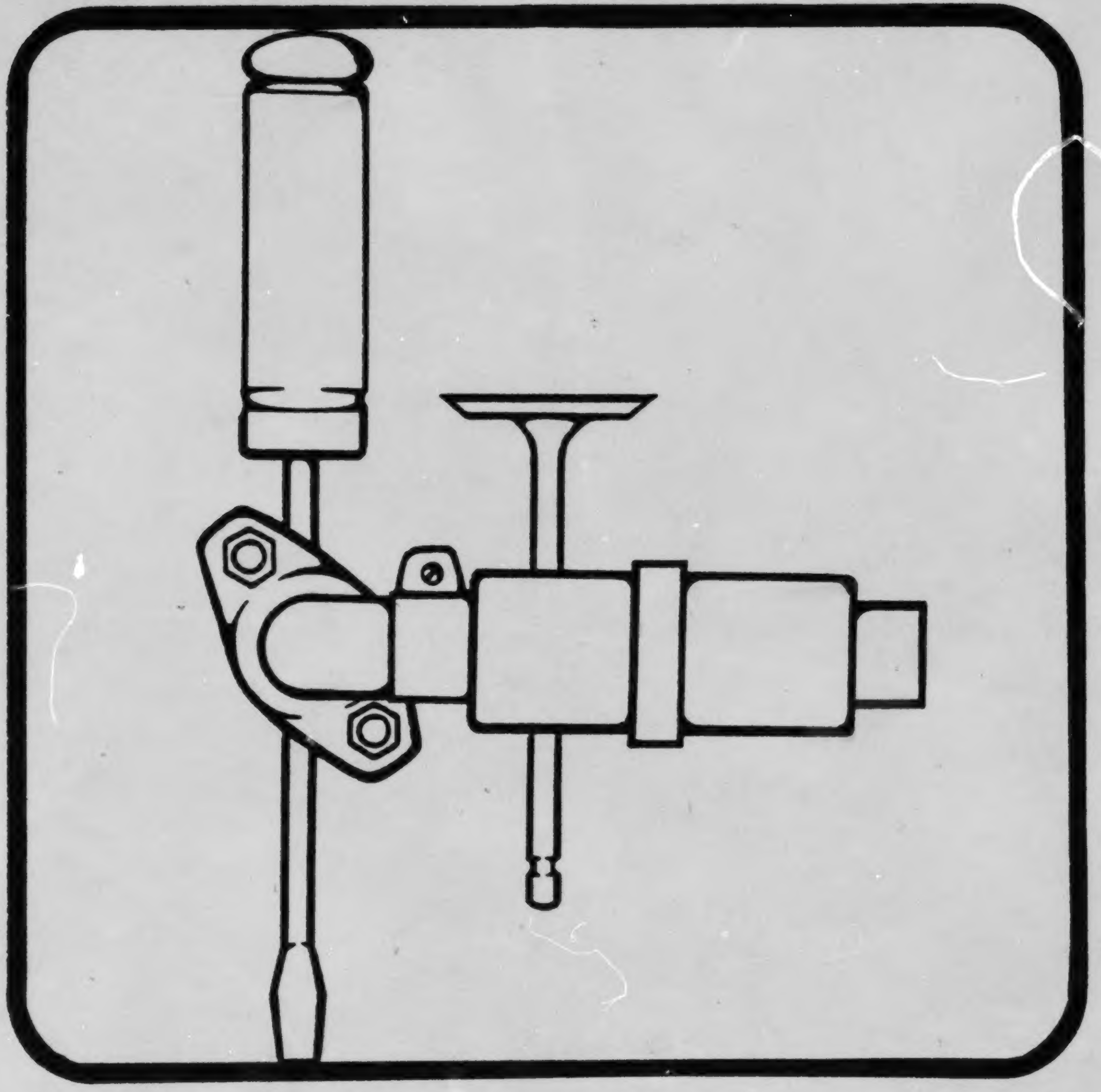
33. CLEAN UP THE MOWER.

34. CLEAN UP YOUR WORK AREA AND TAKE CARE OF TOOLS.

LOOK:



CHECK: ASK YOUR INSTRUCTOR TO CHECK YOUR WORK.



small engine repair

unit: ENGINE REMOVAL AND REPLACEMENT

capital area career center

module: 7501 15 003 1
7501 15 003 3 **date:** AUGUST 1977 **level:** IV

skill title: REMOVE AND REPLACE ENGINE ON SELF-PROPELLED MOWER

developed & written by: JIM PITTS AND DWIGHT SMITH

visuals by: DAVE WEHRWEIN, STEVE BRAMER & BRUCE BENNETT

WORD GUIDE

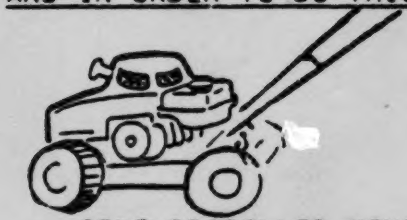
SELF PROPELLED - NEEDS NO OUTSIDE HELP TO MOVE; MOVES ITSELF

PERFORMANCE OBJECTIVE

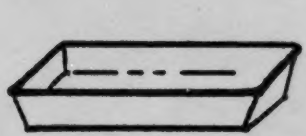
YOU ARE GOING TO LEARN:

HOW TO REMOVE AND REPLACE THE ENGINE AND HOW TO HOOK UP THE WHEEL DRIVE OF A SELF-PROPELLED LAWN BOY MOWER.

AND IN ORDER TO DO THIS YOU WILL NEED:

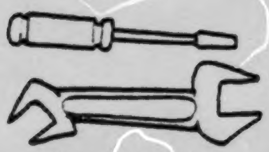


SELF-PROPELLED MOWER
WITH ENGINE



OIL DRAIN PAN

IMPACT WRENCH



HAND TOOLS

SERVICE
MANUAL

SERVICE MANUAL FOR
MOWER

SAFETY GLASSES

MODULES 7501 05 007 1
7501 05 007 3

"TURN THE PAGE"

WORD GUIDE

ENGAGED - CONNECTED, OR IN GEAR

DISENGAGED - NOT CONNECTED, OUT OF GEAR

WE WILL KNOW YOU CAN DO IT WHEN:

1. YOU HAVE ALL THE EQUIPMENT YOU NEED.
2. YOU HAVE REMOVED AND REPLACED THE ENGINE.
3. YOU HAVE HOOKED-UP THE DRIVEWHEEL SO THE MOWER MOVES AND THE DRIVE UNIT ENGAGES AND DISENGAGES PROPERLY.
4. THE MOWER IS SAFE TO RUN.

"TURN THE PAGE"

WORD GUIDE

CAREFULLY - WITH CARE

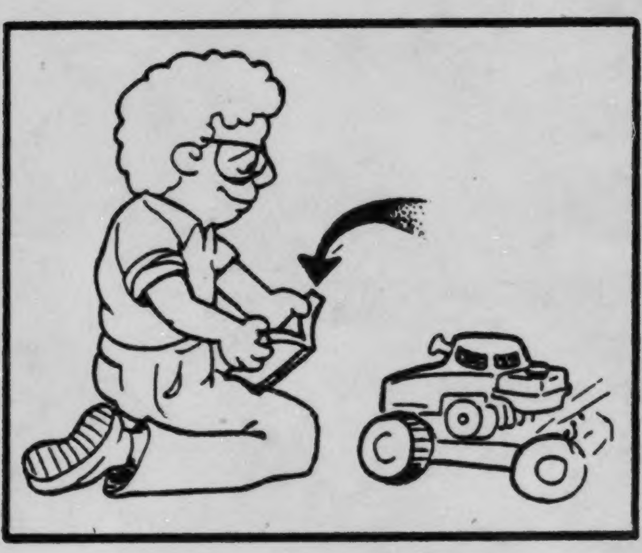
JOB STEPS

READ: LOOK:

1. TAKE ALL EQUIPMENT AND SUPPLIES TO YOUR WORK AREA.

NOTE: WEAR SAFETY GLASSES!

2. FIND THE SERVICE MANUAL FOR YOUR MOWER AND READ THE SECTIONS ABOUT REMOVING AND REPLACING THE ENGINE.



3. CAREFULLY LOOK AT THE MOWER AND THE WAY THE PARTS CONNECT. THIS WILL HELP YOU RE-BUILD IT AGAIN LATER.

CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

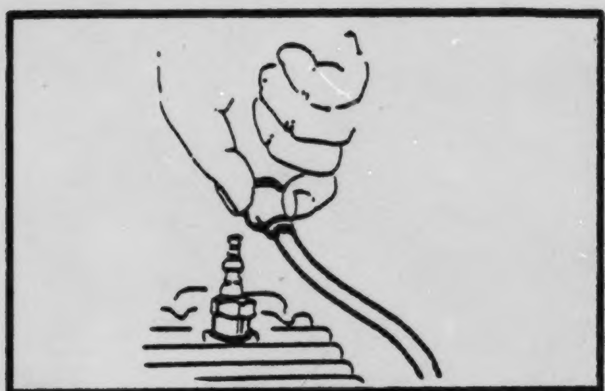
1. PUT ON SAFETY GLASSES.
2. ALL THE EQUIPMENT YOU NEED.
3. THE RIGHT SERVICE MANUAL.
4. LOOKED CAREFULLY AT THE MOWER.

"TURN THE PAGE"

JOB STEPS

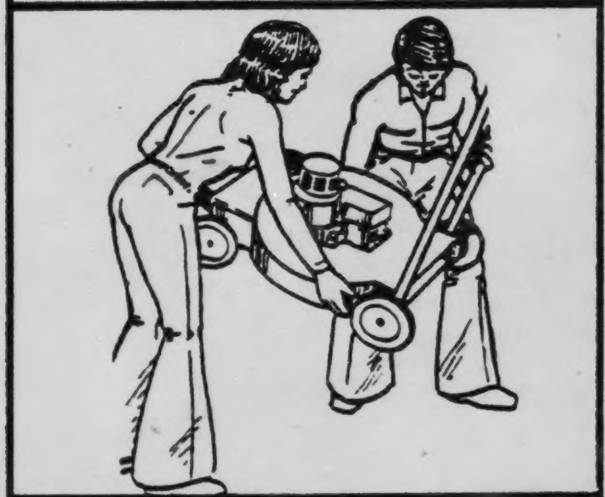
READ: LOOK:

4. TAKE OFF THE SPARK PLUG WIRE. →



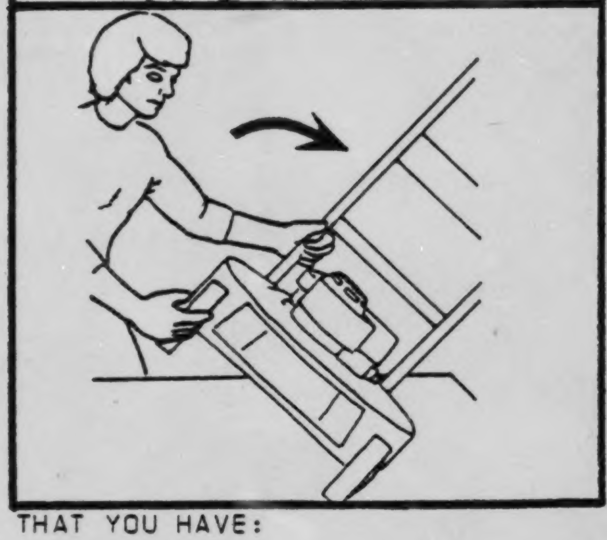
5. LIFT THE MOWER ONTO THE WORK BENCH. →

   NOTE: IF THE MOWER IS HEAVY, GET SOMEONE TO HELP YOU.



6. DRAIN THE GAS.

7. TIP THE MOWER OVER ON ITS LEFT SIDE. →



8. LOOK AT THE BLADE AND THE WAY THAT IT IS INSTALLED.

CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

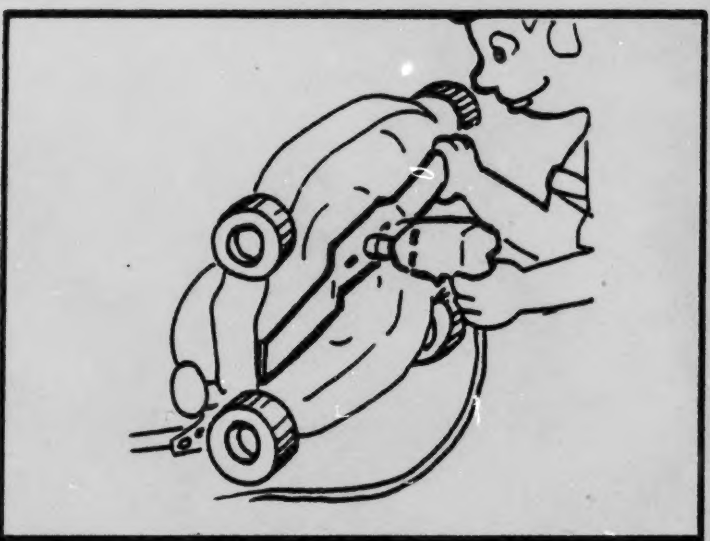
1. TAKEN OFF THE SPARK PLUG WIRE.
2. PUT THE MOWER ON THE BENCH.
3. DRAINED THE OIL.
4. FOUND OUT HOW TO REMOVE THE BLADE.

"TURN THE PAGE"

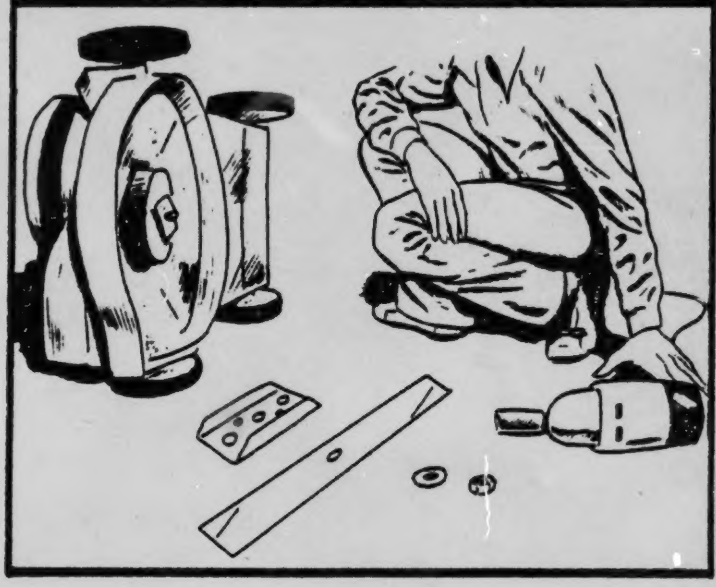
JOB STEPS

READD: LOOK:

9. USE THE IMPACT WRENCH AND PROPER SOCKET TO REMOVE THE BLADE. HOLD THE BLADE WITH ONE HAND AND USE THE WRENCH WITH THE OTHER. →



10. WATCH CAREFULLY AS YOU TAKE OFF THE BLADE AND HUB TO SEE HOW THEY FIT. LAY OUT THE PARTS IN ORDER, AS THEY COME OFF. →



"TURN THE PAGE"

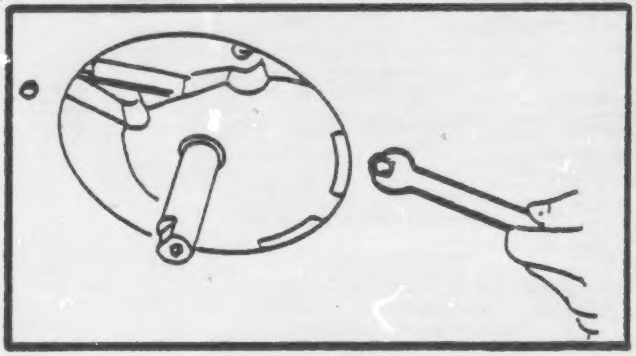
WORD GUIDE

DISCONNECT - PULL OUT OR SEPARATE

JOB STEPS

READ: LOOK:

11. LOOSEN THE ENGINE MOUNTING BOLTS AND NUTS.

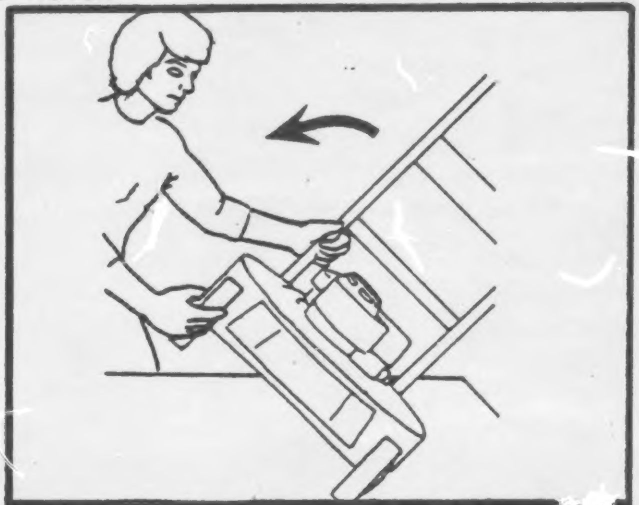


CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

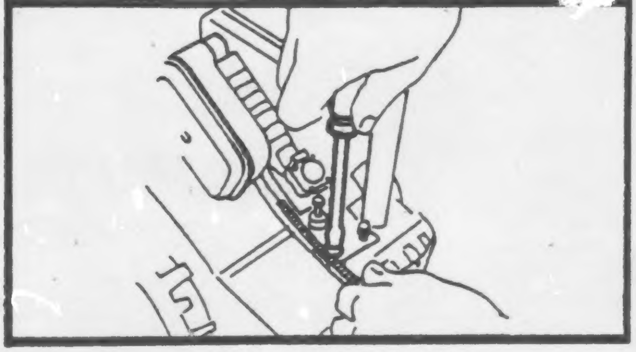
1. REMOVED THE BLADE.
2. LAID OUT THE PARTS IN ORDER.
3. LOOKED CAREFULLY AT THE DRIVE UNIT.
4. REMOVED THE BELT AND LOOSENED THE ENGINE MOUNTING BOLTS AND NUTS.

12. REMOVE ALL BUT ONE OF THE BOLTS AND NUTS.

13. TIP THE MOWER BACK DOWN ONTO ITS WHEELS.



14. DISCONNECT ANY ENGINE CONTROLS (STARTER OR THROTTLE CONTROLS).

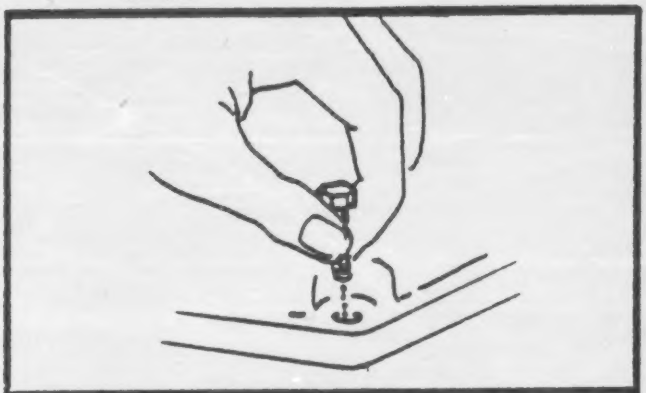


"TURN THE PAGE"

JOB STEPS

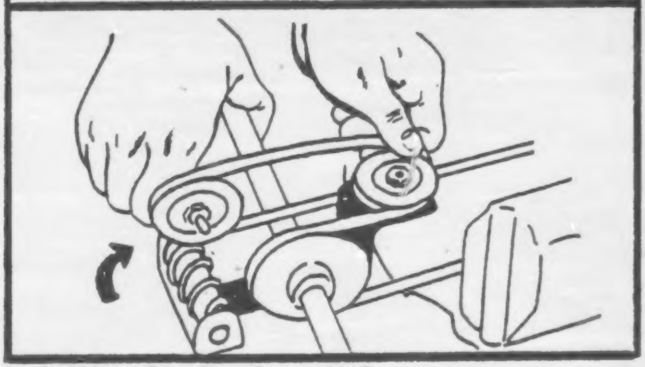
READ: **LOOK:**

15. TAKE OUT THE LAST MOUNTING BOLT AND NUT. →



16. A. IF THE BELT IS ON THE BOTTOM OR SIDE OF ENGINE, CAREFULLY SLIDE THE ENGINE AWAY FROM BELT OR DRIVE SLEEVE AND REMOVE THE ENGINE.

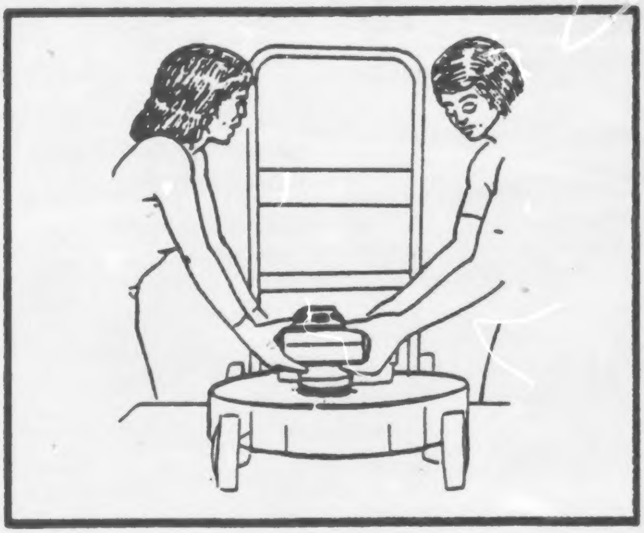
B. IF THE BELT IS ON TOP, REMOVE THE BELT AS SHOWN, AND THEN REMOVE THE ENGINE.



CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

1. REMOVED THE BOLTS AND NUTS.
2. TIPPED THE MOWER BACK DOWN.
3. REMOVED THE ENGINE CONTROLS.
4. REMOVED THE ENGINE.

17. PUT THE ENGINE BACK ON THE MOWER. →



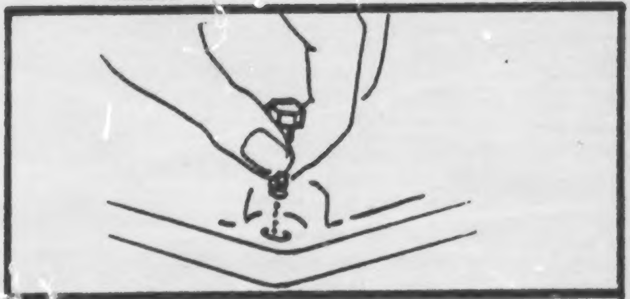
18. SLIDE THE ENGINE TOWARD THE BELT OR DRIVE SLEEVE, IF NECESSARY.

"TURN THE PAGE"

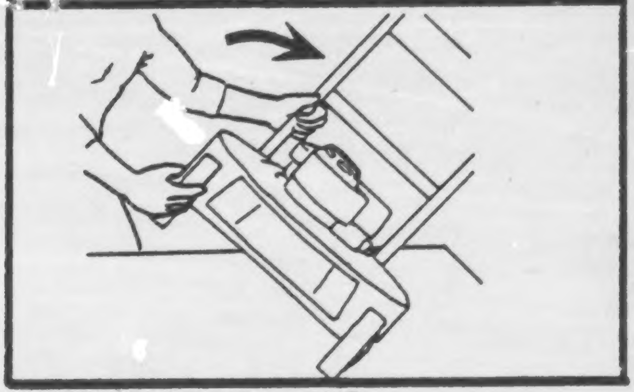
JOB STEPS

READ: LOOK:

19. PUT ON ONE BOLT AND NUT TO HOLD THE ENGINE IN PLACE.



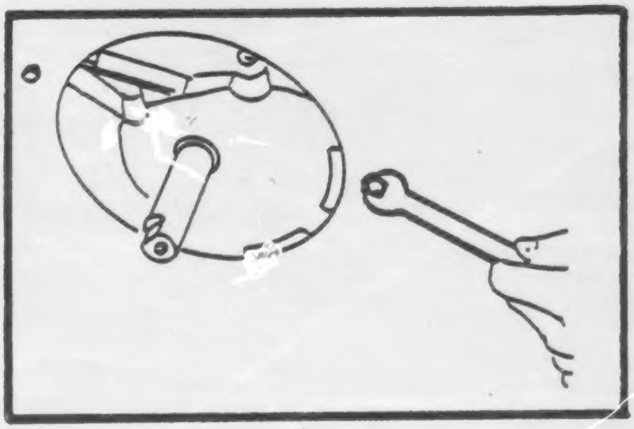
20. TIP THE MOWER BACK ONTO ITS SIDE AGAIN AND MAKE SURE THE BELT IS ON THE PULLEY CORRECTLY (OR THAT THE PINS ARE IN THE DRIVE SLEEVE ALL THE WAY).



CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

1. PUT THE ENGINE BACK ON THE MOWER.
2. PUT ON ONE BOLT AND NUT.
3. CHECKED THE DRIVE BELT OR SLEEVE.

21. PUT THE REST OF THE MOUNTING BOLTS INTO THE PROPER HOLES AND TIGHTEN THE MOUNTING BOLTS AND NUTS.

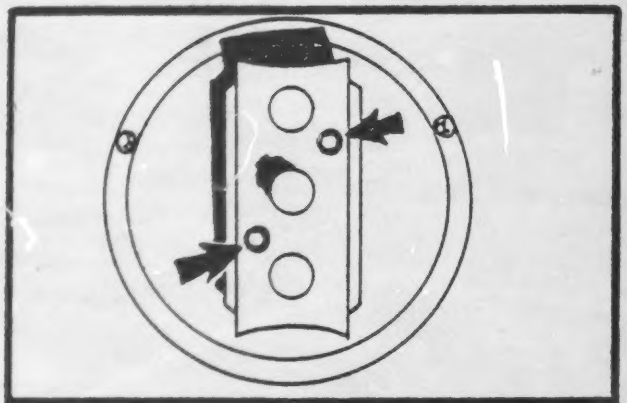


"TURN THE PAGE"

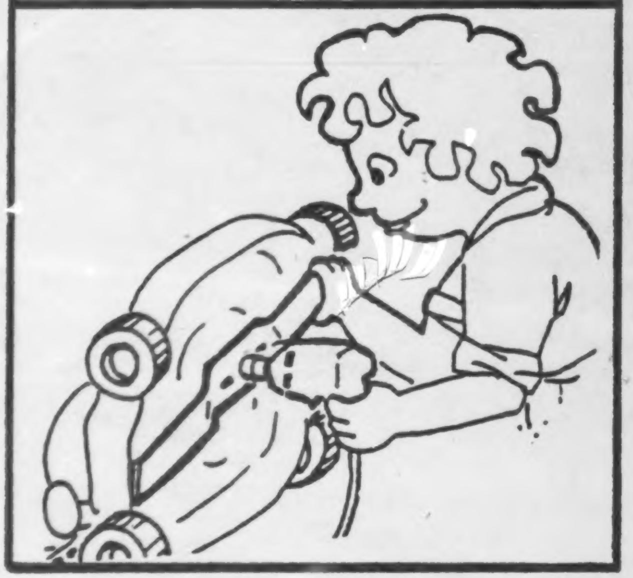
JOB STEPS

READ: LOOK:

22. PUT IN THE BLADE AND HUB. BE SURE TO LINE UP THE HOLES IN THE HUB AS SHOWN. →



23. USE THE IMPACT WRENCH AND PROPER SOCKET TO MAKE THE BLADE TIGHT. →



CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

1. PUT IN THE MOUNTING BOLTS.
2. PUT IN THE BLADE AND HUB PROPERLY.
3. PUT IN THE OIL DRAIN PLUG AND MADE ALL BOLTS TIGHT.

"TURN THE PAGE"

WORD GUIDE

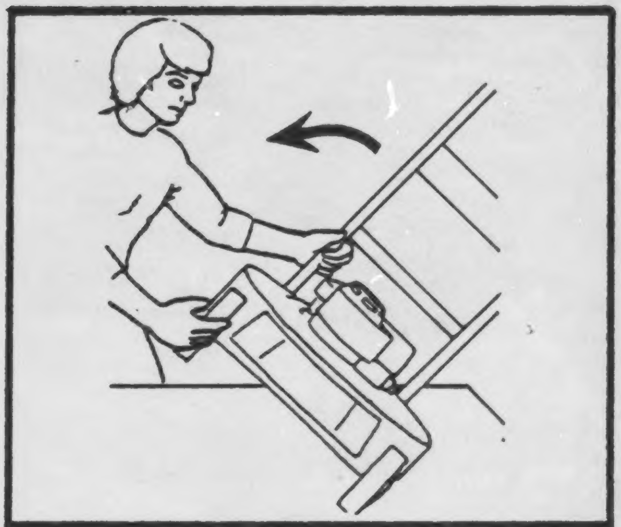
ALIGNMENT - PROPER POSITION.

JOB STEPS

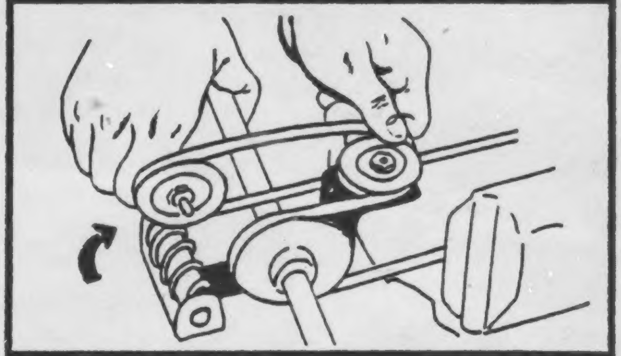
READ:

LOOK:

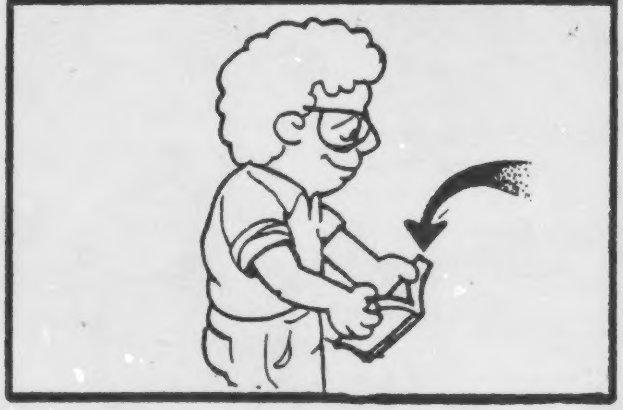
24. TIP MOWER BACK DOWN ONTO ITS WHEELS.



25. IF THE BELT IS ON TOP OF MOWER, PUT THE BELT ON AND CHECK ITS ALIGNMENT.



26. CHECK IN THE SERVICE MANUAL TO SEE WHICH WAY THE BELT GOES. IF IT IS ON WRONG, THE MOWER WILL BACK UP!

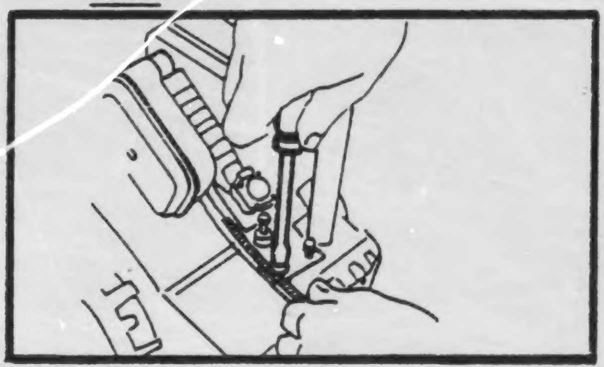


"TURN THE PAGE"

JOB STEPS

READ: LOOK:

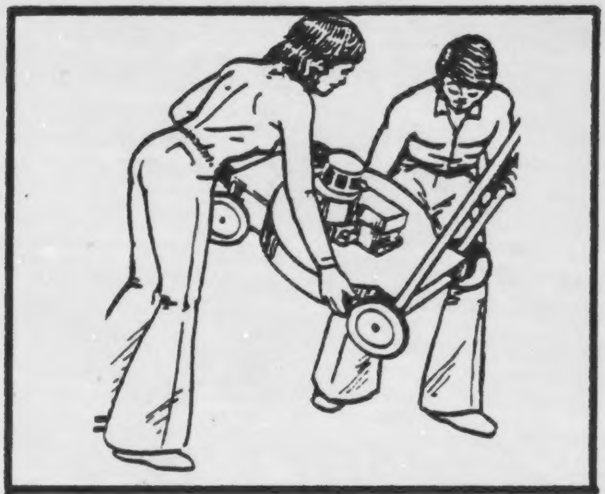
27. HOOK-UP THE ENGINE CONTROLS. →



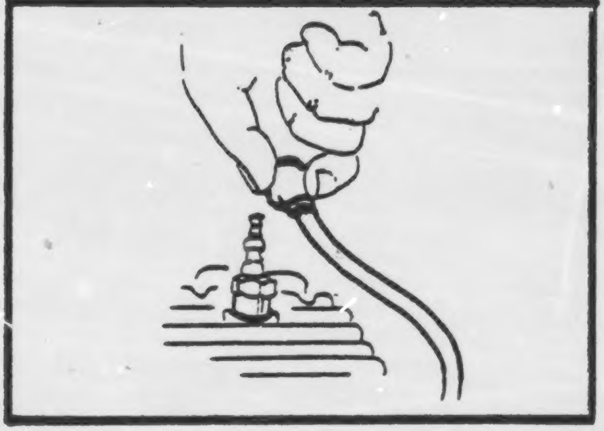
CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

1. TIPPED MOWER BACK DOWN.
2. PUT OIL IN THE ENGINE.
3. PUT THE BELT ON AND CHECKED IT FOR ALIGNMENT AND DIRECTION.
4. HOOKED-UP ENGINE CONTROLS PROPERLY.

28. PUT THE MOWER ON THE FLOOR. GET HELP IF YOU NEED IT. →



29. PUT ON THE SPARK PLUG WIRE. →



30. PUT 2-CYCLE FUEL IN TANK.

"TURN THE PAGE"

WORD GUIDE

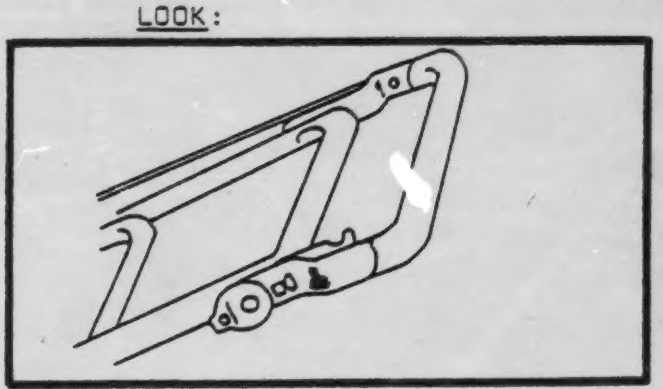
ADJUST - SET

JOB STEPS

READ:

LOOK:

31. PUT DRIVE CONTROL IN "NEUTRAL". →

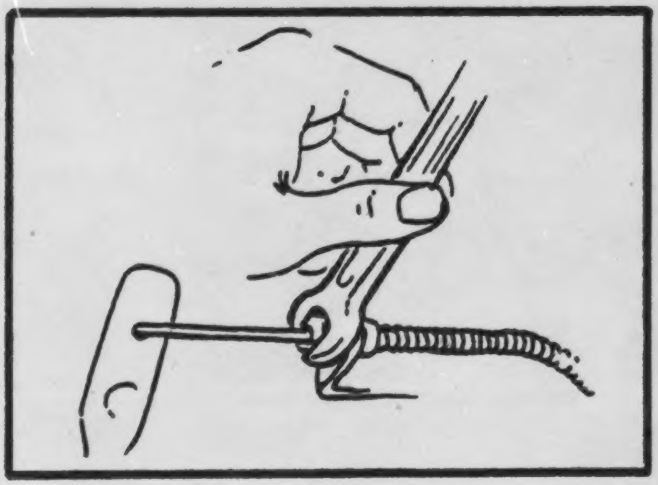


CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

1. PUT THE MOWER ON THE FLOOR.
2. CONNECTED THE SPARK PLUG.
3. ENOUGH GAS.
4. PUT THE DRIVE CONTROL IN "NEUTRAL".

CAUTION: DO NOT STAND IN FRONT OF MOWER WHEN YOU START IT.

32. START MOWER AND ADJUST THROTTLE AND CHOKE LINKAGE (SEE MODS: 7501 05 007 1
7501 05 007 3) →

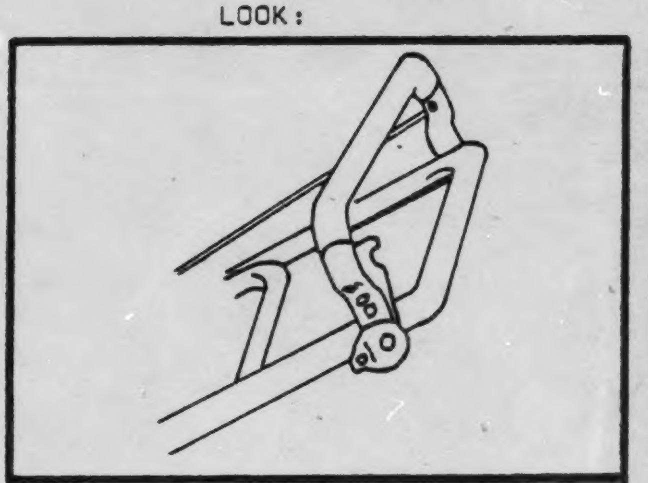


"TURN THE PAGE"

JOB STEPS

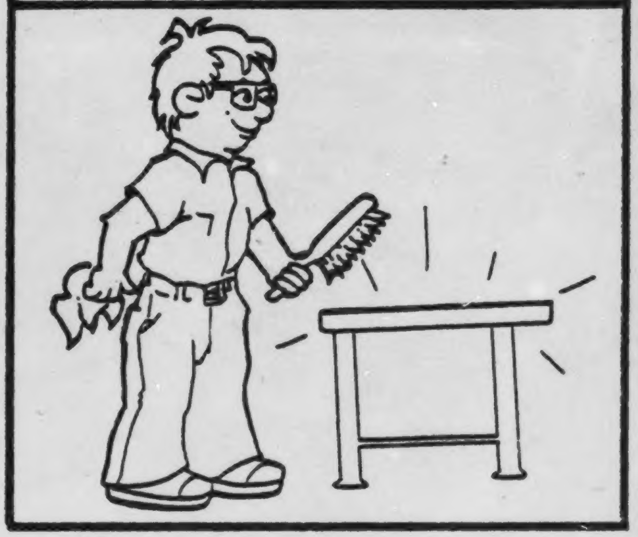
READ: LOOK:

33. CHECK THE DRIVE UNIT BY CAREFULLY MOVING THE CONTROL TO "FORWARD".



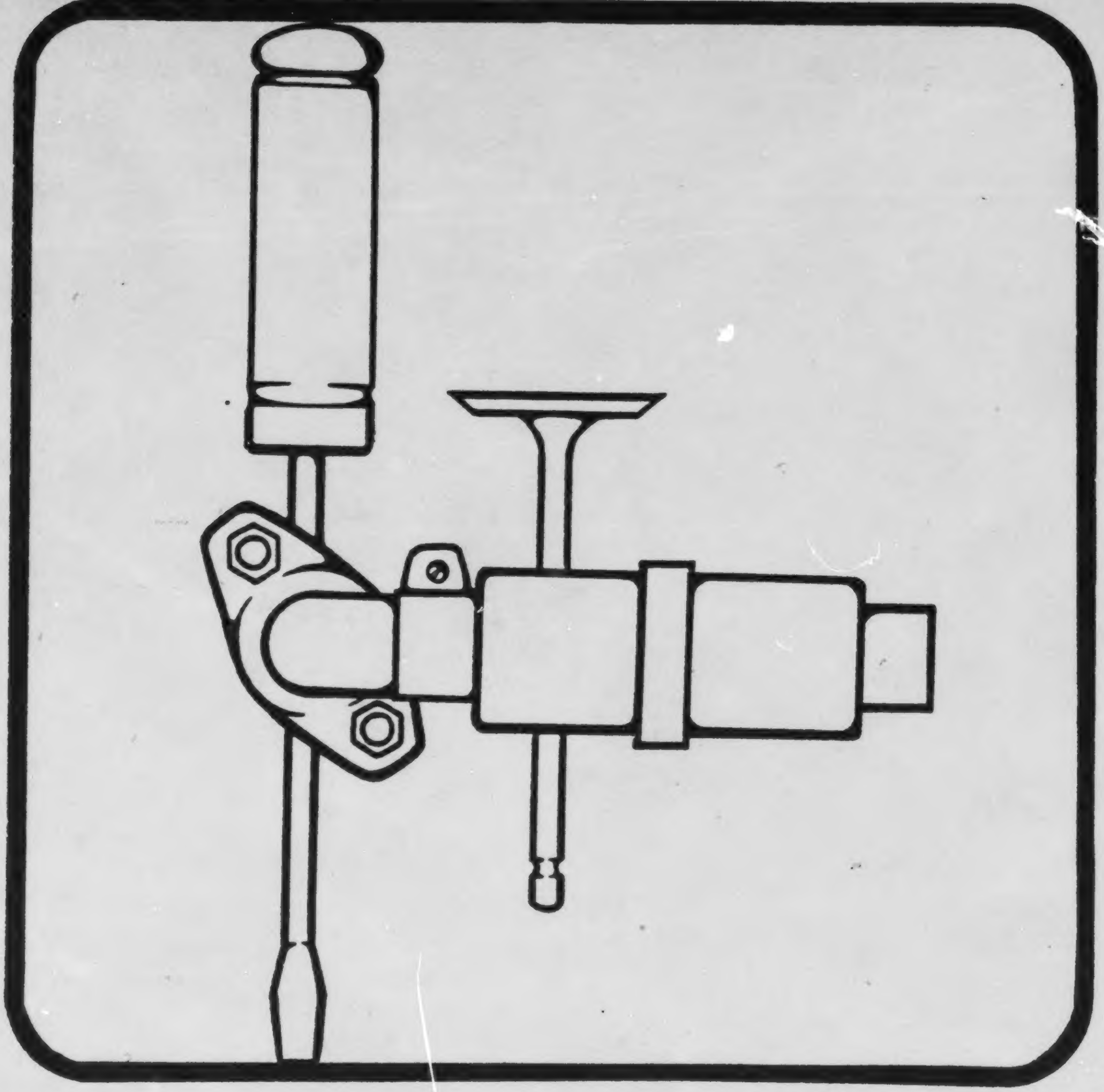
34. PUT THE DRIVE CONTROL IN NEUTRAL AND TURN OFF THE MOWER.

35. PUT AWAY TOOLS AND CLEAN UP THE WORK AREA.



CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

1. STARTED MOWER.
2. REBUILT THE MOWER PROPERLY SO IT RUNS, ENGAGES AND DISENGAGES PROPERLY.
3. PUT AWAY TOOLS AND CLEANED UP THE WORK AREA.



small engine repair

unit: ENGINE REMOVAL AND REPLACEMENT

capital area career center

module: 7501 15 004 1
7501 15 004 3 date: JANUARY 1978 level: IV

skill title: REMOVE AND REPLACE ENGINE ON ELECTRIC START RIDING TRACTOR - SIMPLICITY

developed & written by: JACK HELDER

visuals by: STEVE BRAMER

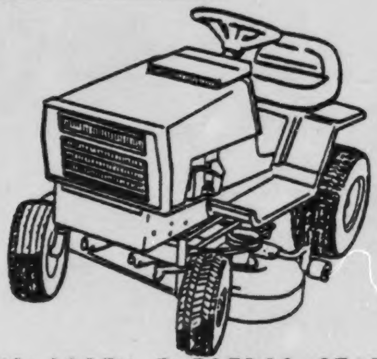
PERFORMANCE OBJECTIVE

YOU ARE GOING TO LEARN:

HOW TO REMOVE AND REPLACE THE ENGINE ON AN ELECTRIC STARTING RIDING MOWER.

AND IN ORDER TO DO THIS YOU WILL NEED:

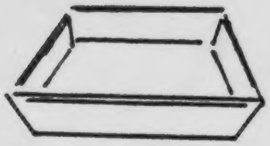
SIMPLICITY SERVICE MANUAL



SIMPLICITY ELECTRIC START RIDING MOWER

SIMPLICITY OWNER'S MANUAL

HAND TOOLS



OIL DRAIN PAN

TORQUE WRENCH

MODULES: 7501 06 001 1
7501 06 001 3
7501 05 007 1
7501 05 007 3
7501 11 001 1
7501 11 001 3

WE WILL KNOW YOU CAN DO IT WHEN:

1. YOU READ THE MODULE.
2. YOU GET YOUR EQUIPMENT.
3. YOU DO THE JOB STEPS FOR REMOVING AND REPLACING THE ENGINE ON AN ELECTRIC START RIDING MOWER.

"TURN THE PAGE"

WORD GUIDE

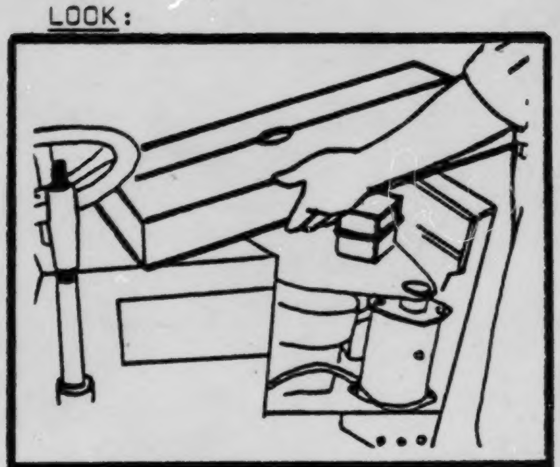
REMOVE - TAKE OFF.

JOB STEPS

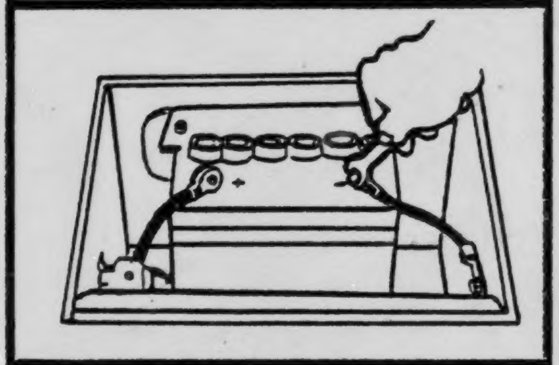
READ:

LOOK:

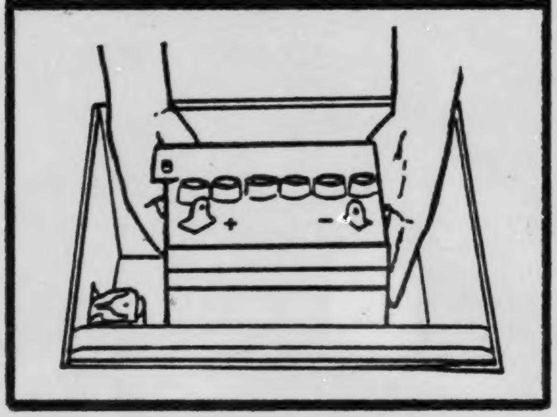
1. REMOVE HOOD. ALSO TAKE OFF THE GRILL IF THERE IS ONE.



2. REMOVE THE NEGATIVE (-) CABLE FROM THE BATTERY FIRST. REMOVE THE POSITIVE (+) CABLE SECOND.



3. REMOVE THE BATTERY FROM THE MOWER. SET IT ON A SHELF OR BOARD.



"TURN THE PAGE"

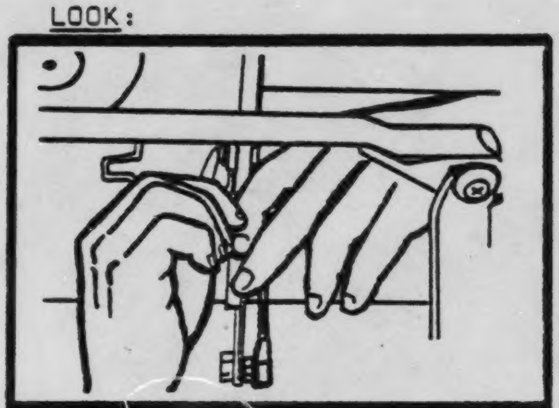
WORD GUIDE

SHROUDS - METAL COVERS TO PROTECT MOVING BELTS.

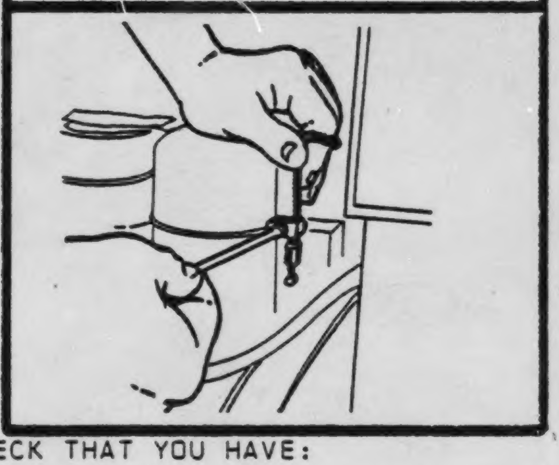
JOB STEPS

READ: LOOK:

4. REMOVE ALL SHROUDS OR GUARDS THAT COVER BELTS.



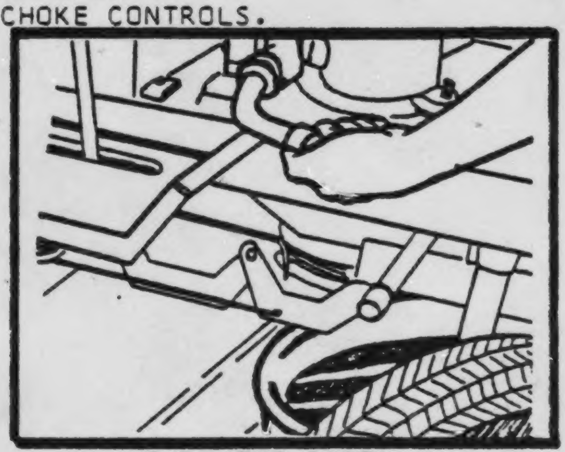
5. REMOVE THE THROTTLE CONTROLS AND CHOKE CONTROLS.



CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

1. REMOVED HOOD.
2. REMOVED BATTERY AND SET IT ON A SHELF.
3. REMOVED BELT GUARDS OR SHROUDS.
4. REMOVED THROTTLE AND CHOKE CONTROLS.

6. DRAIN OIL AND WIPE UP ANY SPILLS.

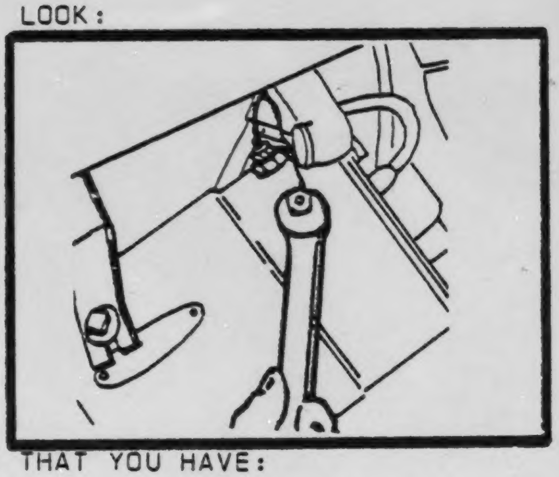


"TURN THE PAGE"

JOB STEPS

READ: LOOK:

7. REMOVE ANY ELECTRIC WIRES LEADING TO THE ENGINE OR STARTER-GENERATOR. →

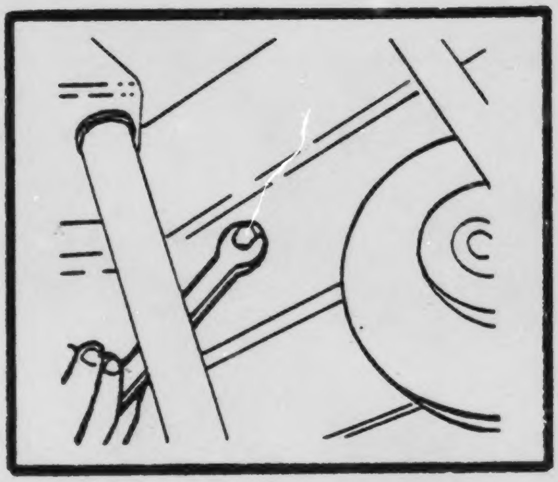


CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

1. DRAINED OIL AND CLEANED UP ANY SPILLS.
2. REMOVED ANY WIRES LEADING TO THE ENGINE OR STARTER-GENERATOR

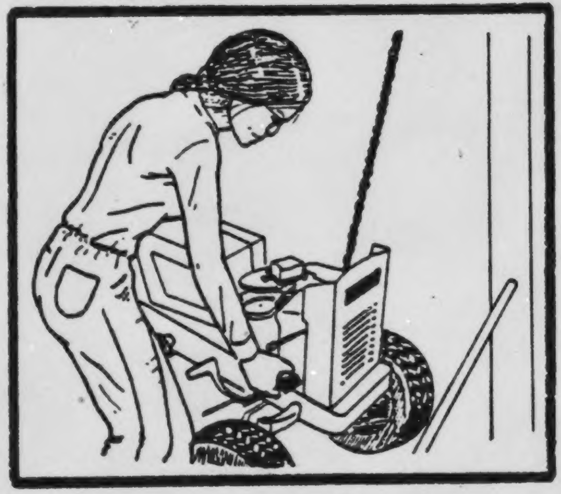
8. REMOVE ENGINE MOUNTING BOLTS. THERE WILL BE 3 OR 4 BOLTS. →

NOTE: MARK THE PLACES WHERE THE MOTOR SITS ON THE FRAME.



CHECK: ASK YOUR INSTRUCTOR TO CHECK YOUR WORK.

9. USE A HOIST TO LIFT THE ENGINE ONLY ENOUGH TO REMOVE THE BELTS FROM THE ENGINE PULLEYS. GO SLOW. →

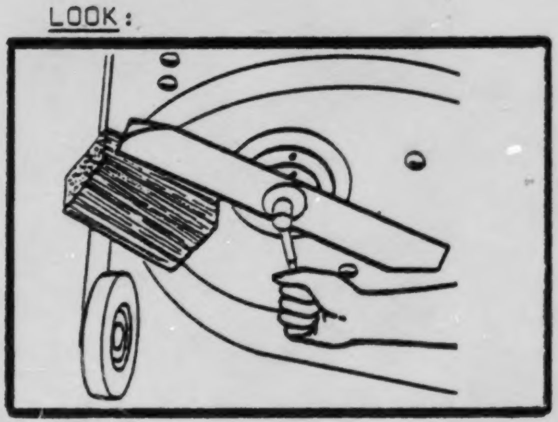


"TURN THE PAGE"

JOB STEPS

READ: LOOK:

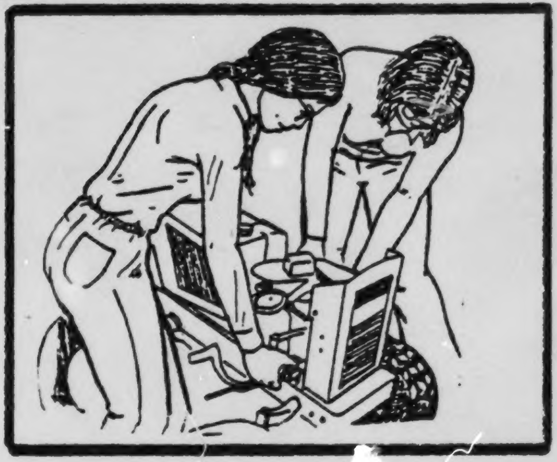
10. REMOVE THE BLADE AND PULLEYS. ➞



CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT:

1. ALL BELTS ARE OFF ENGINE PULLEYS.
2. YOU HAVE REMOVED THE BLADE AND PULLEY.

11. HAVE YOUR INSTRUCTOR HELP YOU LIFT THE ENGINE OUT OF THE MOWER. ➞



12. DO ANY NEEDED REPAIRS TO THE ENGINE. THEN ASK YOUR INSTRUCTOR IF YOU CAN PUT THE ENGINE BACK INTO THE TRACTOR.

"TURN THE PAGE"

WORD GUIDE

INSTALL - TO PUT IN.

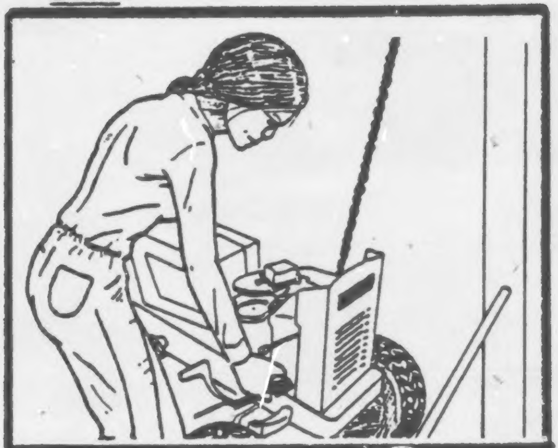
JOB STEPS

READ:

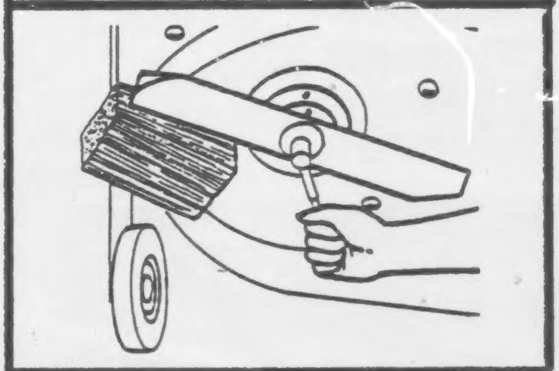
LOOK:

13. IF YOUR INSTRUCTOR TOLD YOU TO, PUT THE ENGINE BACK IN THE TRACTOR.

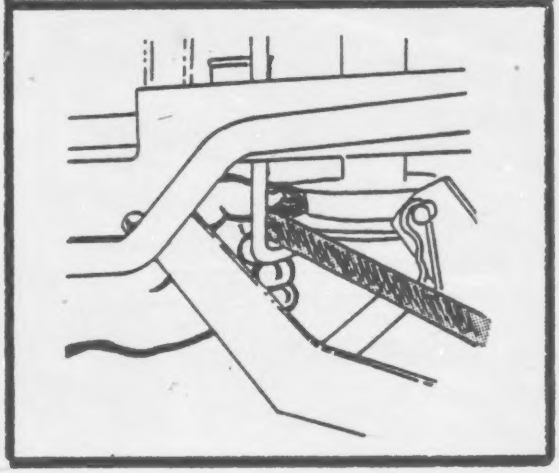
NOTE: DON'T PUT IT IN ALL THE WAY. YOU STILL NEED TO ATTACH PULLEYS AND BELTS IN STEPS 14 AND 15.



14. INSTALL BLADE AND PULLEYS (SEE MODULE 7501 11 001 1 7501 11 001 3.



15. PUT BELTS ON PULLEYS. CHECK TO SEE THAT THE BELT STOP IS INSTALLED RIGHT.



"TURN THE PAGE"

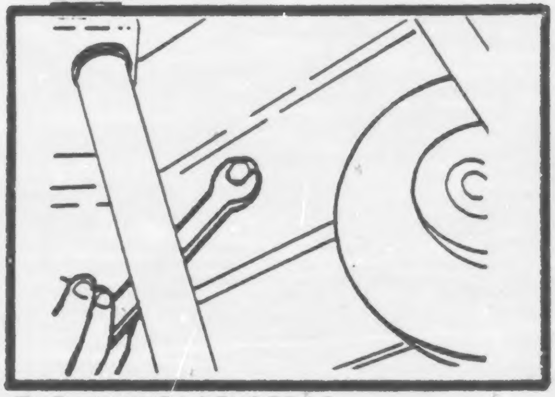
WORD GUIDE

TORQUE - TIGHTEN TO THE AMOUNT IN SPECIFICATIONS.

JOB STEPS

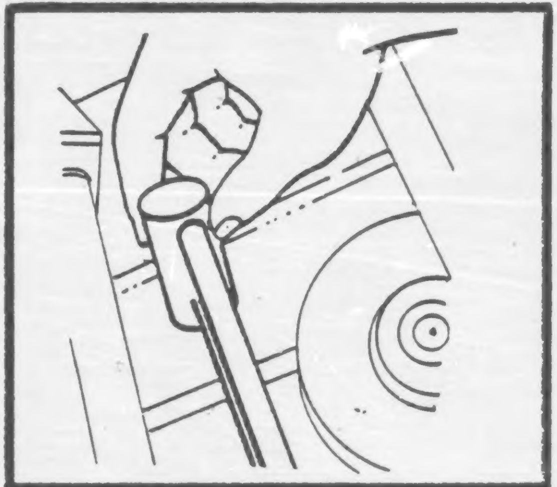
READ: LOOK:

16. INSTALL ALL THE MOUNTING BOLTS- -NOT TOO TIGHT.

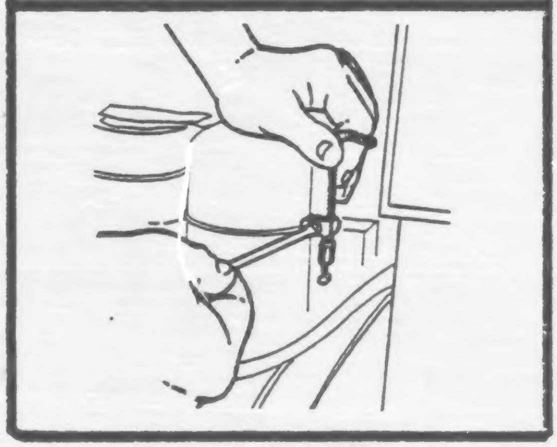


CHECK: IF BOLTS ARE SLOTTED, GET THE MANUFACTURER'S MANUAL- -FOLLOW DIRECTIONS IN THE MANUAL. THEN ASK YOUR INSTRUCTOR TO CHECK YOUR WORK.

17. TORQUE THE MOUNTING BOLTS. ASK YOUR INSTRUCTOR HOW MUCH PRESSURE TO USE.



18. HOOK UP THROTTLE CONTROLS.



19. HOOK UP CHOKE CONTROLS.

"TURN THE PAGE"

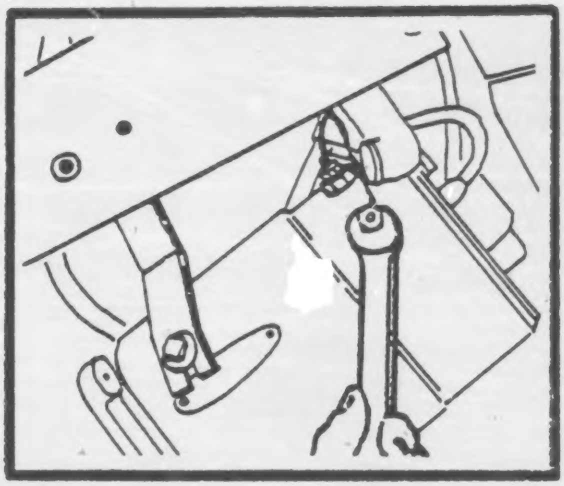
JOB STEPS

READ: LOOK:

CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

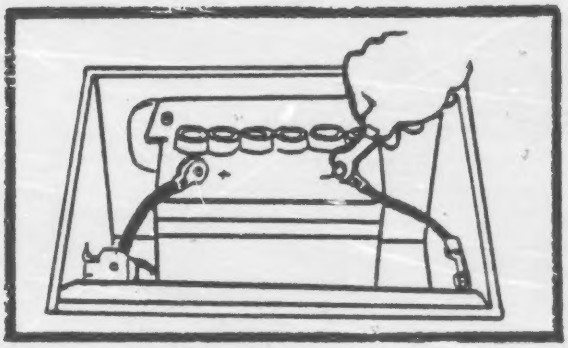
1. TORQUED MOUNTING BOLTS THE RIGHT AMOUNT.
2. HOOKED UP THROTTLE CONTROLS.
3. HOOKED UP CHOKE CONTROLS.

20. HOOK UP ALL ELECTRIC WIRES.



21. FILL ENGINE WITH OIL AND WIPE UP ANY SPILLS.

22. BE SURE TO HOOK UP THE POSITIVE CABLE FIRST, THEN THE NEGATIVE CABLE. IF YOU HAVE ANY QUESTIONS, ASK YOUR INSTRUCTOR.



CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

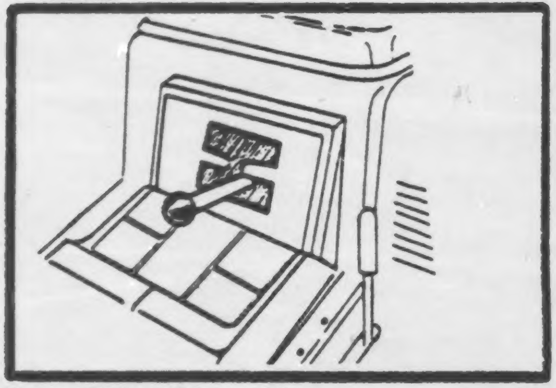
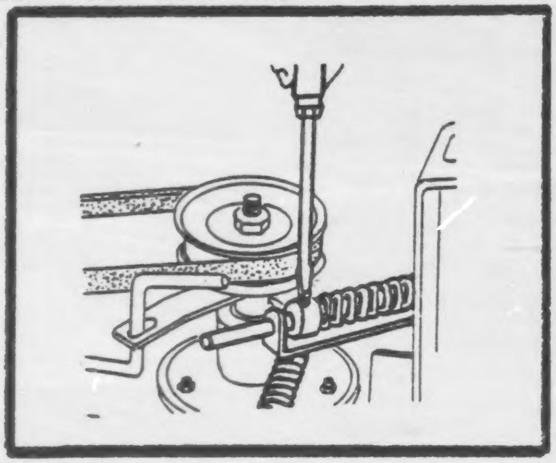
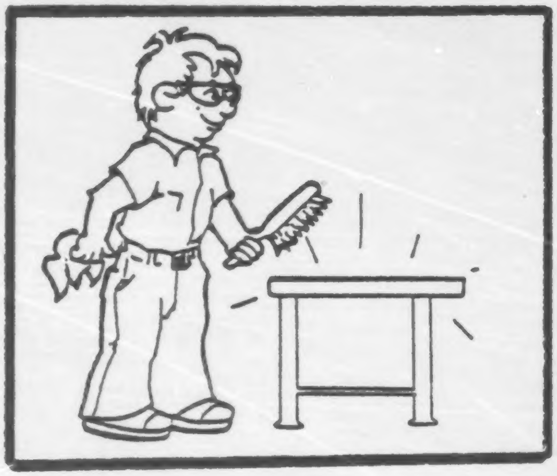
1. HOOKED UP ELECTRIC WIRES.
2. FILLED WITH OIL AND CLEANED UP.
3. INSTALLED BATTERY.

"TURN THE PAGE"

WORD GUIDE

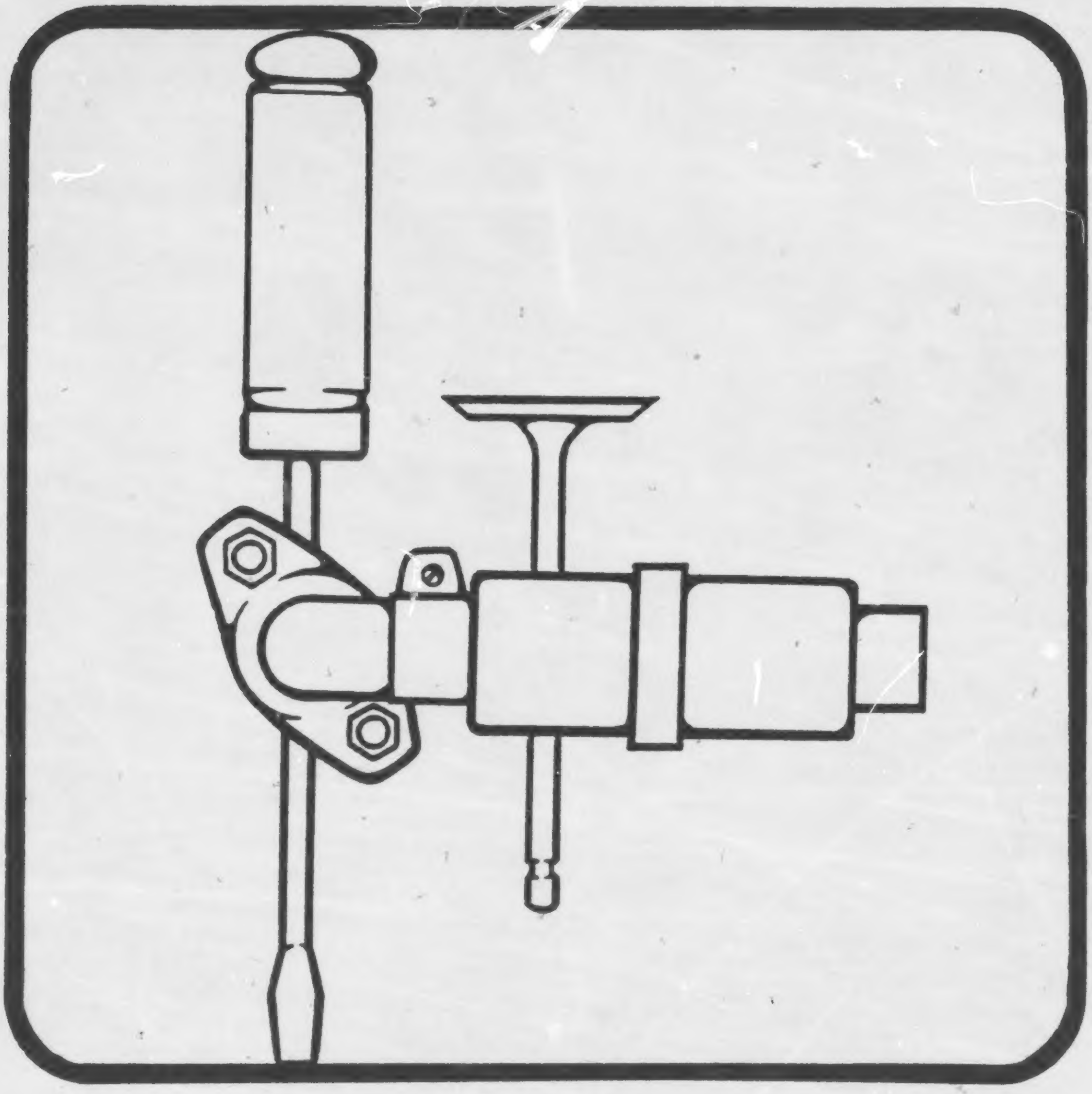
NEUTRAL - OUT OF GEAR

JOB STEPS

READ:	LOOK:
23. PUT ALL CONTROLS IN NEUTRAL. →	
24. TEST AND ADJUST THE MOWER IF YOU NEED TO. →	
25. PUT ALL YOUR EQUIPMENT AWAY. CLEAN YOUR WORK AREA. →	

CHECK: ASK YOUR INSTRUCTOR TO CHECK YOUR WORK AND START THE ENGINE.

CHECK: ASK YOUR INSTRUCTOR TO TEST THE MOWER AND CHECK YOUR WORK.



small engine repair

unit: ENGINE BLOCK

capital area career center

module: 7501 15 005 1
7501 15 005 3
date: OCTOBER 1977
level: II

skill title: REMOVE AND REPLACE ENGINE ON RIDING MOWER - JACOBSEN

developed & written by: JACK HELDER

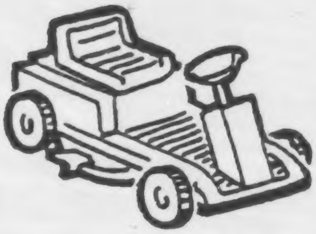
visuals by: BRUCE BENNETT

PERFORMANCE OBJECTIVE

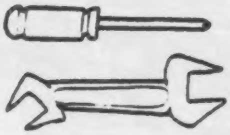
YOU ARE GOING TO LEARN:

HOW TO REMOVE AND REPLACE THE ENGINE ON A JACOBSEN RIDING MOWER.

AND IN ORDER TO DO THIS YOU WILL NEED:



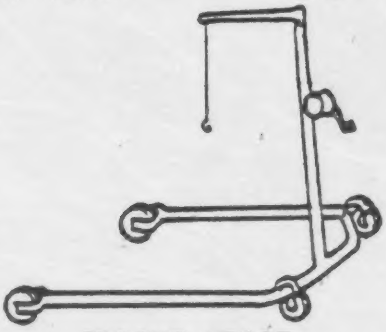
JACOBSEN RIDING MOWER



HAND TOOLS

SAFETY GLASSES

OIL DRAIN PAN



ENGINE HOIST

IMPACT WRENCH

OWNER'S
MANUAL

OPERATING MANUAL
MODEL #42635

WE WILL KNOW YOU CAN DO IT WHEN:

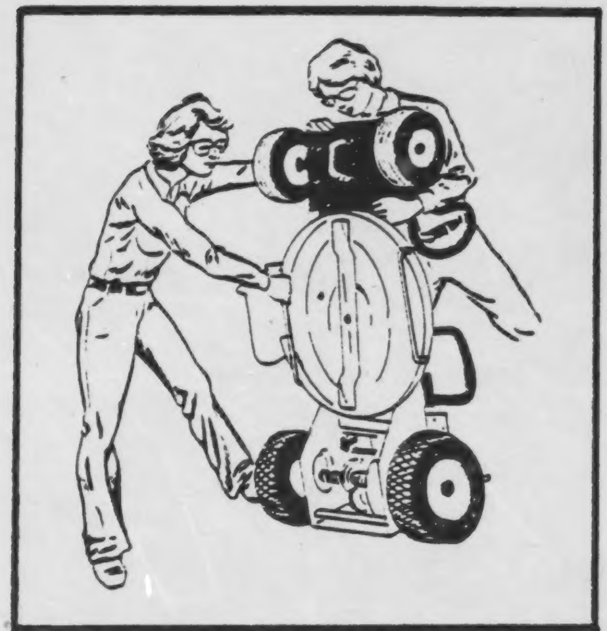
1. YOU READ THE MODULE.
2. YOU GET YOUR EQUIPMENT.
3. YOU DO THE JOB STEPS FOR REMOVING AND REPLACING THE ENGINE ON A RIDING MOWER.
4. THE MOWER YOU WORKED ON RUNS IN FORWARD AND REVERSE, AND THE MOWER WORKS WELL.

JOB STEPS

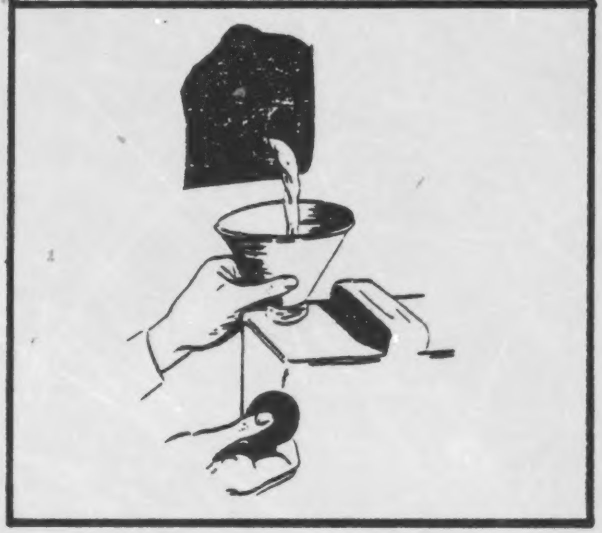
READ: LOOK:

1. TAKE ALL YOUR EQUIPMENT TO THE WORK AREA.

2. HAVE SOMEONE HELP YOU TIP THE MOWER ON ITS REAR END. →



3. DRAIN THE GAS FROM THE GAS TANK. →

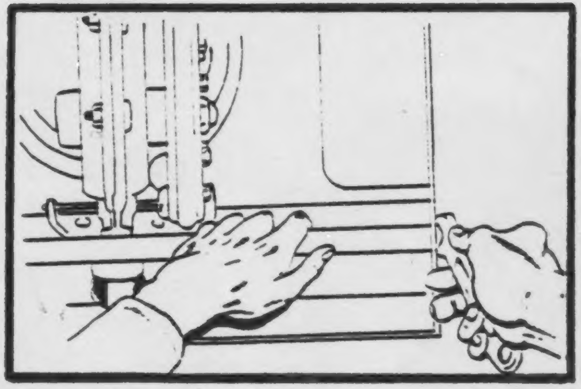


"TURN THE PAGE"

JOB STEPS

READ: LOOK:

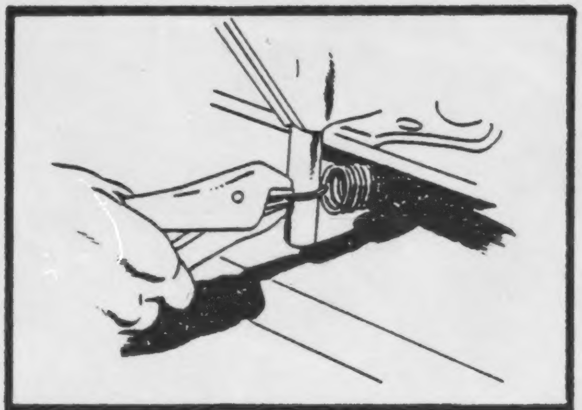
4. REMOVE FRAME SPACER BRACKET. →



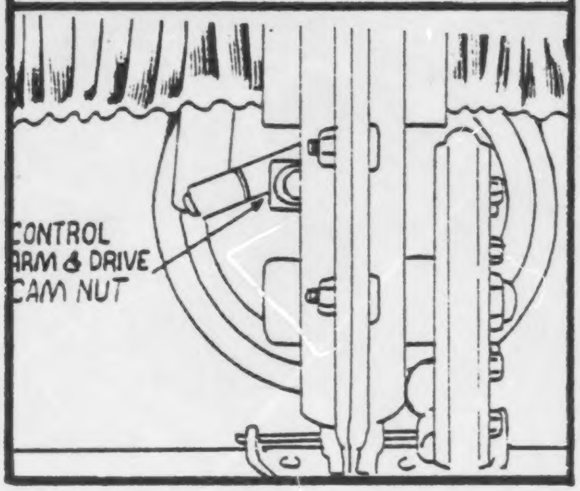
CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

1. SET MOWER ON ITS REAR.
2. DRAINED GAS.
3. REMOVED FRAME SPACER BRACKET.

5. USE PLIERS TO REMOVE THE DRIVE TENSION SPRING. →



6. REMOVE THE NUT TO THE CONTROL ARM AND DRIVE CAM. →

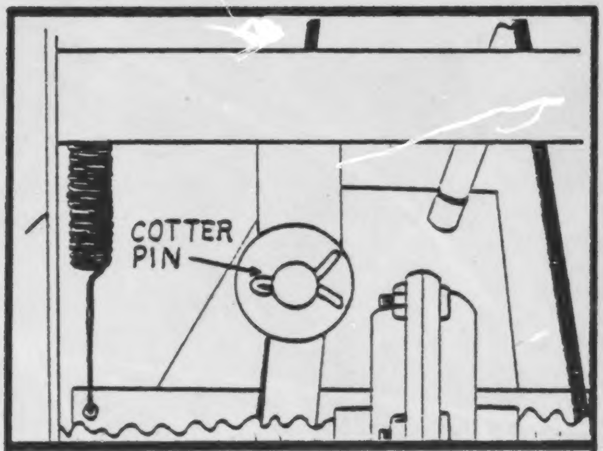


"TURN THE PAGE"

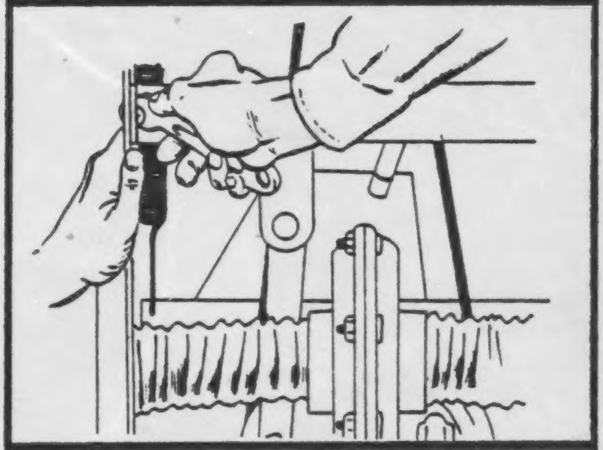
JOB STEPS

READ: LOOK:

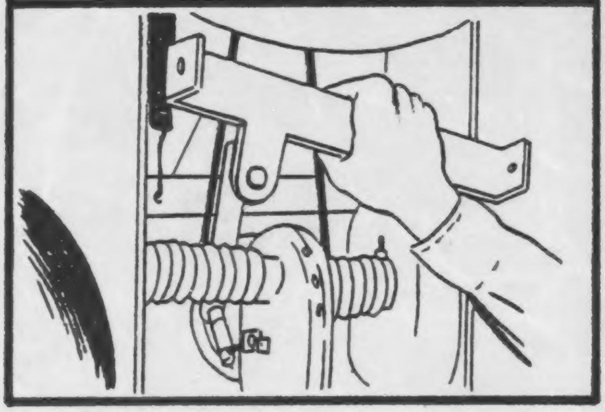
8. TAKE OUT THE COTTER PIN FROM THE CLUTCH CROSS BRACE ASSEMBLY.



9. TAKE NUTS AND BOLTS OUT OF THE CLUTCH CROSS BRACE ASSEMBLY.



10. REMOVE THE CLUTCH CROSS BRACE ASSEMBLY.



CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

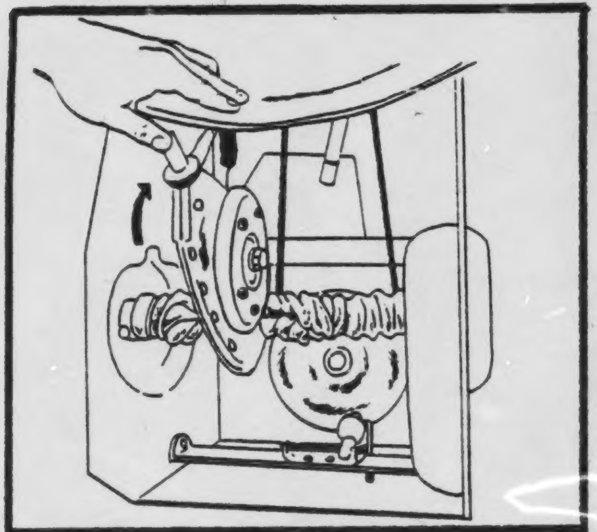
1. REMOVED DRIVE TENSION SPRING.
2. REMOVED NUT TO THE CONTROL ARM AND DRIVE CAM.
3. WIRED UP THE CHAIN CASE SO IT IS OUT OF THE WAY.
4. REMOVED COTTER PIN FROM CLUTCH CROSS BRACE ASSEMBLY.
5. REMOVED THE CLUTCH BRACE ASSEMBLY.

"TURN THE PAGE"

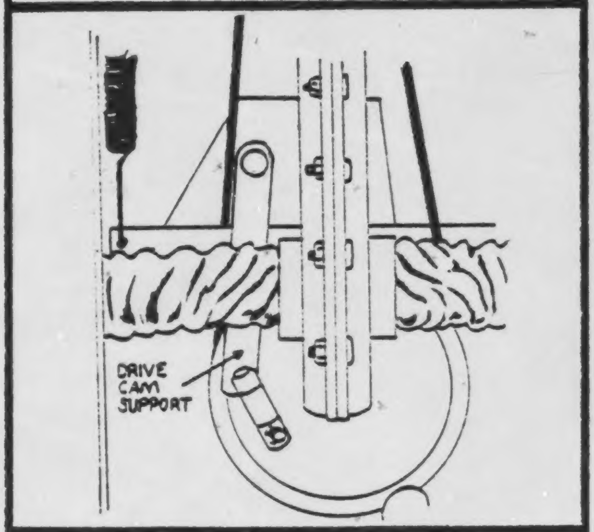
JOB STEPS

READ: LOOK:

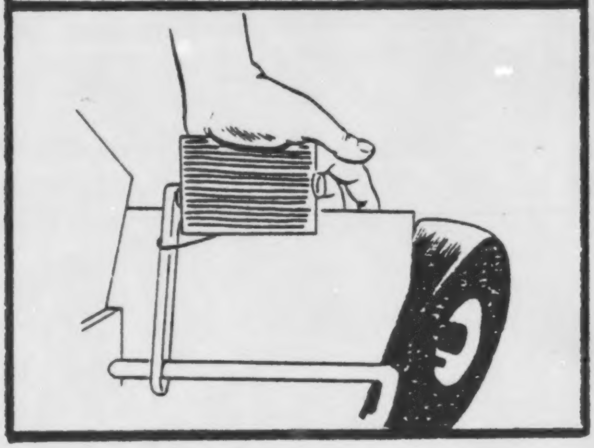
7. WIRE THE CHAIN CASE UP OUT OF YOUR WAY. →



11. NOW REMOVE THE DRIVE CAM SUPPORT. →



12. WIRE DOWN THE CLUTCH PEDAL TO KEEP IT OUT OF THE WAY OF THE ENGINE DRIVE DISK. →

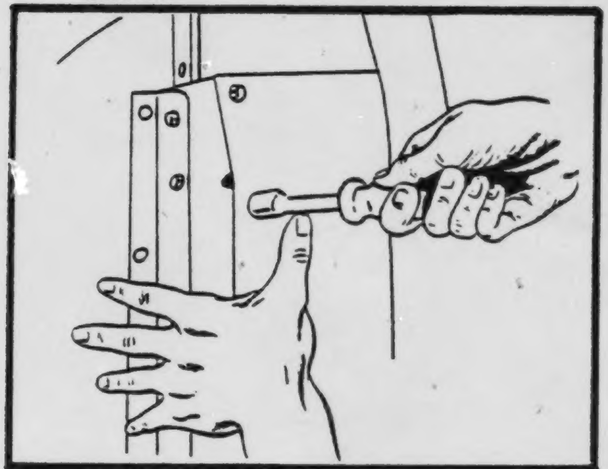


"TURN THE PAGE"

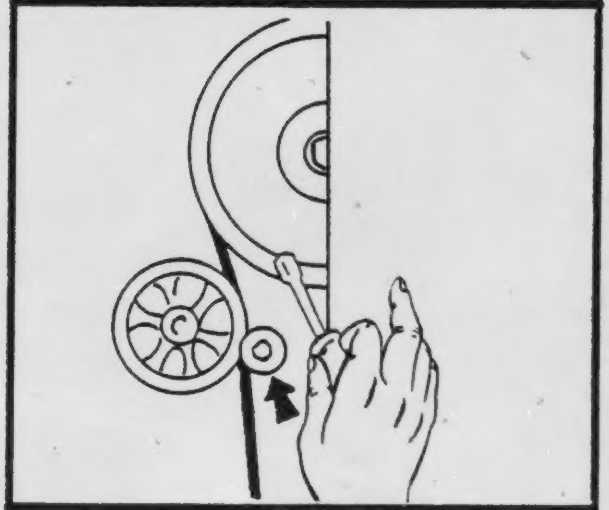
JOB STEPS

READD: LOOK:

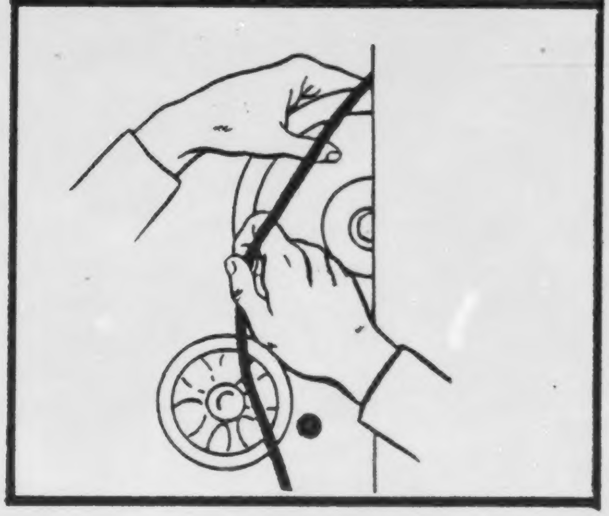
13. USE A 3/8 INCH WRENCH TO REMOVE SCREWS FROM THE COVER ON THE MOWER.



14. REMOVE THE BELT IDLER ARM GUIDE.



15. NOW REMOVE THE BELT FROM THE MOWER DRIVE PULLEY.

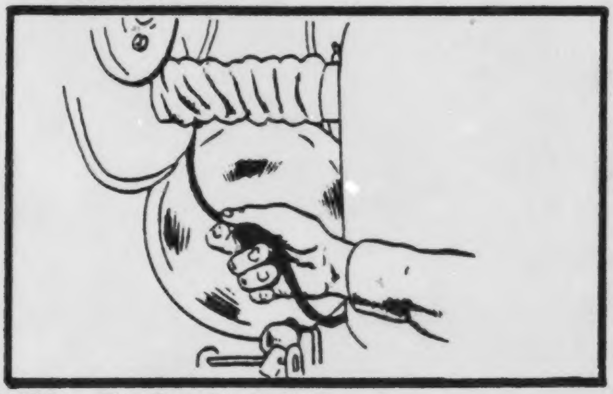


"TURN THE PAGE"

JOB STEPS

READ: LOOK:

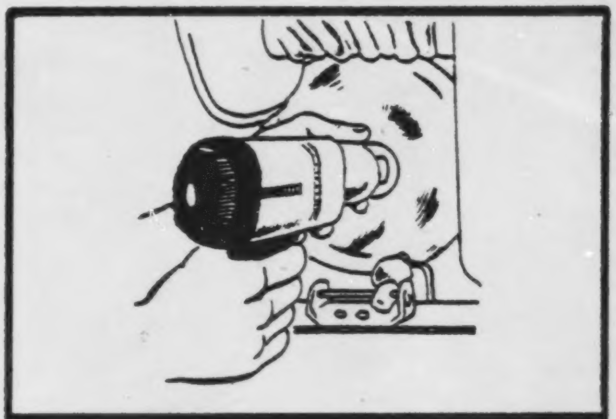
16. THEN TAKE THE BELT OFF THE OTHER PULLEY AND ENGINE DRIVE DISK. →



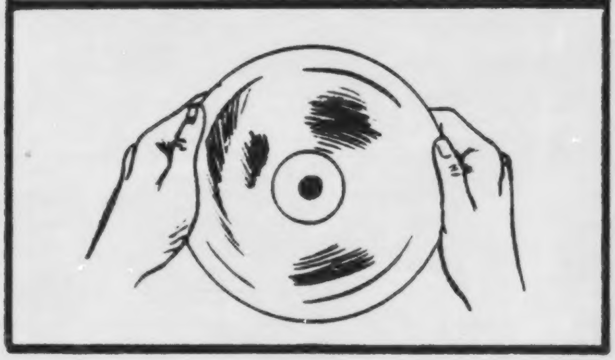
CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

1. REMOVED CAM DRIVE SUPPORT.
2. WIRED DOWN THE CLUTCH.
3. REMOVED MOWER COVER.
4. REMOVED BELT IDLER ARM.
5. REMOVED THE BELT FROM PULLEYS AND ENGINE DRIVE DISK.

17. GET AN ELECTRIC IMPACT WRENCH AND 9/16 INCH SOCKET. USE THEM TO REMOVE THE BOLT FROM THE ENGINE DRIVE DISK. →



18. USE A HAMMER TO TAP THE BACK OF THE ENGINE DRIVE DISK UNTIL IT COMES OFF. →

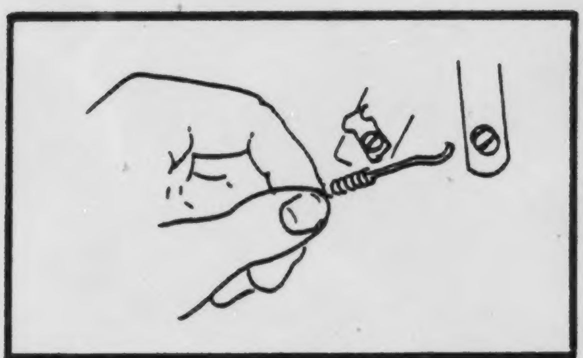


"TURN THE PAGE"

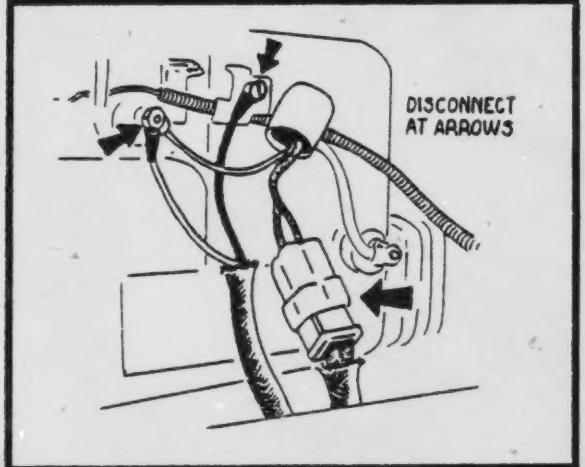
JOB STEPS

READ: LOOK:

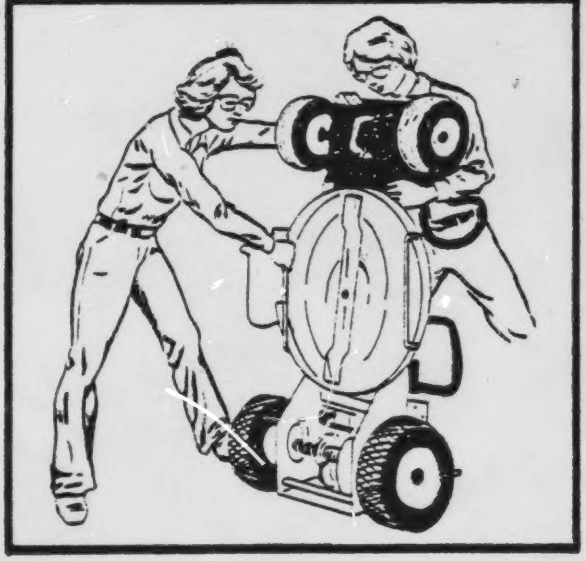
19. REMOVE THE THROTTLE CABLE FROM THE ENGINE. →



20. REMOVE ELECTRICAL WIRES TO THE ENGINE. →



21. PUT THE MOWER DOWN ON ITS WHEELS. THEN USE A 1/2 INCH SOCKET AND 9/16 INCH WRENCH TO REMOVE ENGINE MOUNTING BOLTS. →



"TURN THE PAGE"

JOB STEPS

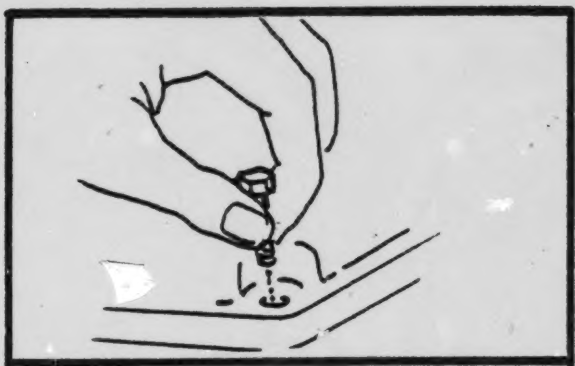
READ: LOOK:

22. REMOVE THE ENGINE. DO ANY NEEDED REPAIRS.

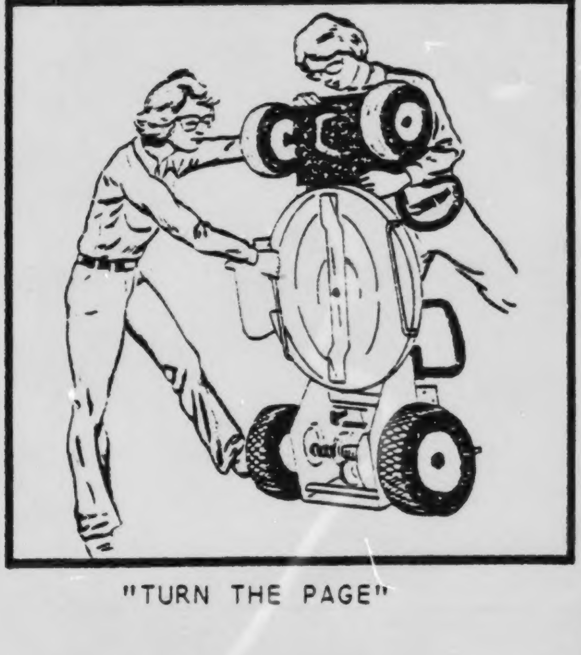
CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

1. REMOVED ENGINE DRIVE DISK.
2. REMOVED THROTTLE CABLE FROM ENGINE.
3. REMOVED ELECTRICAL WIRES TO ENGINE.
4. REMOVED THE ENGINE FROM THE RIDING MOWER.

23. TO REPLACE ENGINE, FIRST PUT ENGINE BACK ON AND TIGHTEN THE MOUNTING BOLTS.



24. AGAIN WIRE DOWN THE CLUTCH PEDAL AND TIP THE MOWER ON ITS REAR END.

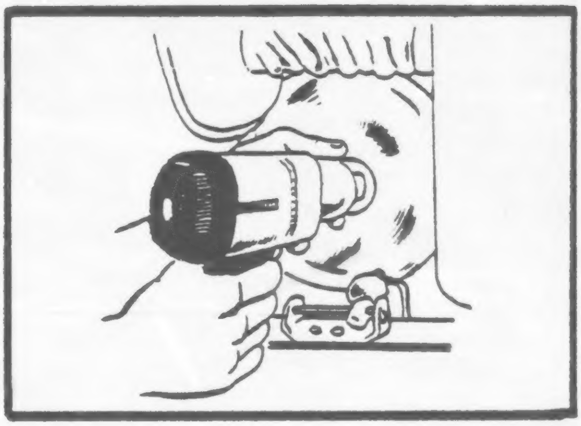


"TURN THE PAGE"

JOB STEPS

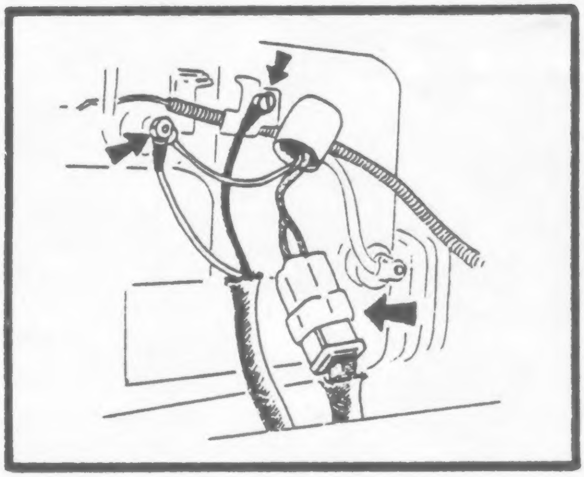
READ: LOOK:

25. PUT ON THE ENGINE DRIVE DISK. TIGHTEN ON THE BOLT WITH A 9/16 INCH SOCKET AND ELECTRIC IMPACT WRENCH. →



26. REMOVE WIRE FROM CLUTCH.

27. REPLACE ELECTRICAL WIRES AND THROTTLE CABLE TO ENGINE. →



CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

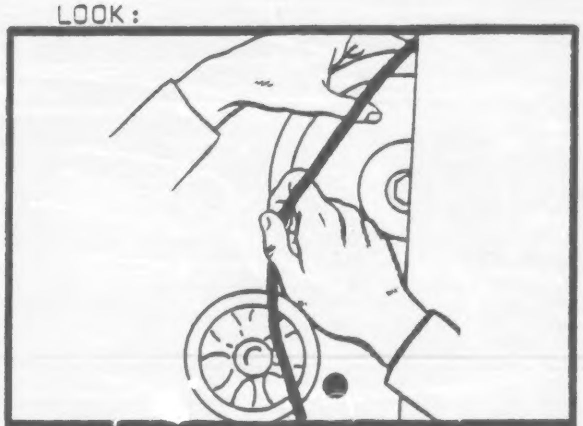
1. REPLACED ENGINE AND TIGHTENED MOUNTING BOLTS.
2. PUT ON AND TIGHTENED THE ENGINE DRIVE DISK.
3. REPLACED AND TIGHTENED ELECTRICAL WIRES AND THROTTLE CABLE ON ENGINE.

"TURN THE PAGE"

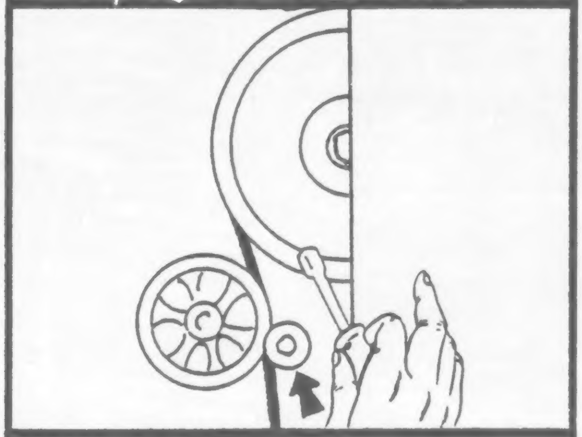
JOB STEPS

READ: LOOK:

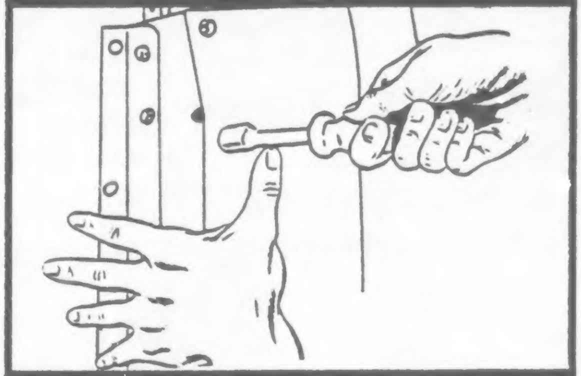
28. PUT BELTS ON ALL PULLEYS.



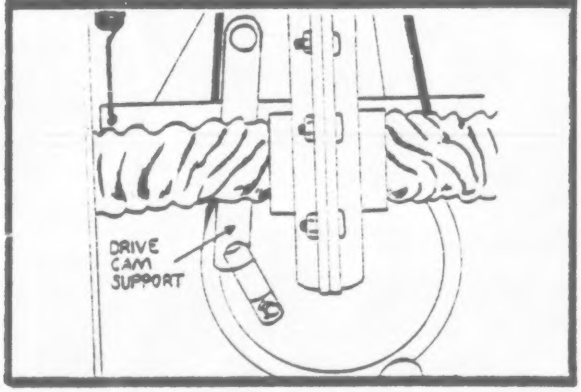
29. REPLACE BELT IDLER ARM GUIDE.



30. REPLACE THE MOWER COVER.



31. PUT ON THE DRIVE CAM SUPPORT.

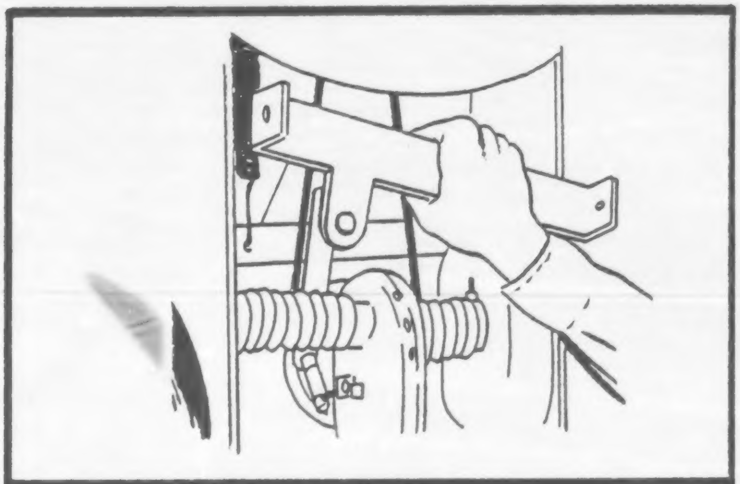

DRIVE CAM SUPPORT

"TURN THE PAGE"

JOB STEPS

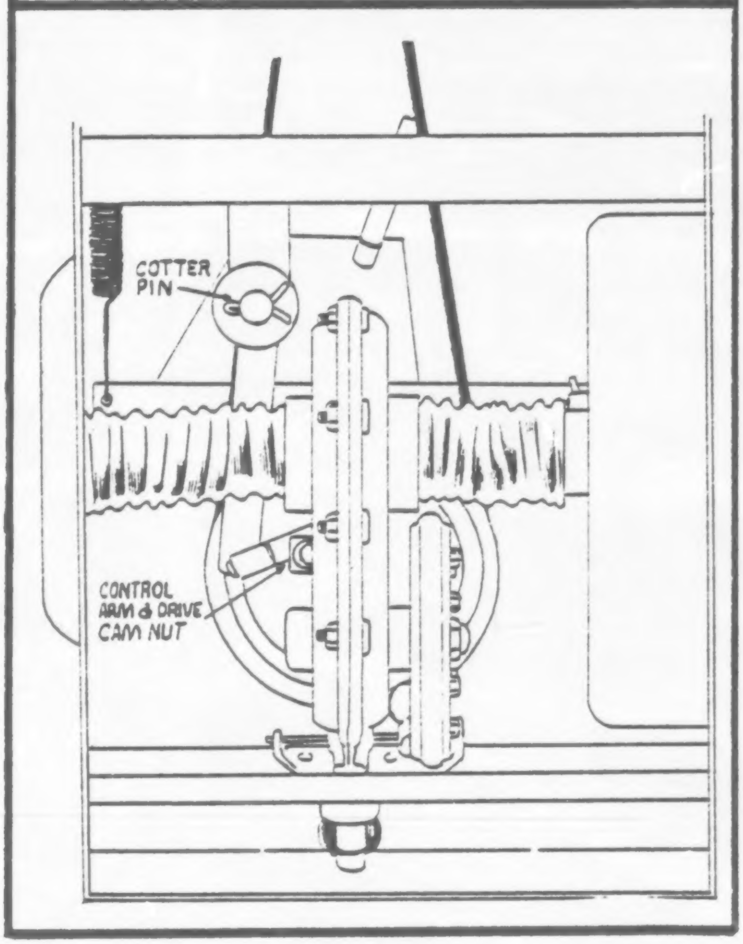
READ: LOOK:

32. PUT ON THE CLUTCH CROSSBRACE ASSEMBLY.



33. PUT THE COTTER PIN BACK IN THE CROSSBRACE ASSEMBLY.

34. HOOK UP THE CONTROL ARM AND DRIVE CAM. TIGHTEN THE NUT.

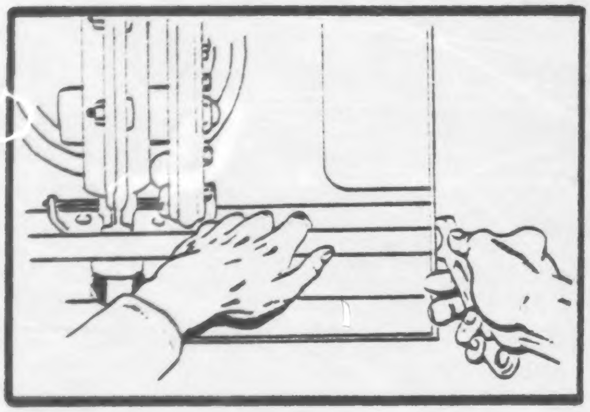

COTTER PIN
CONTROL ARM & DRIVE CAM NUT

"TURN THE PAGE"

JOB STEPS

READ: LOOK:

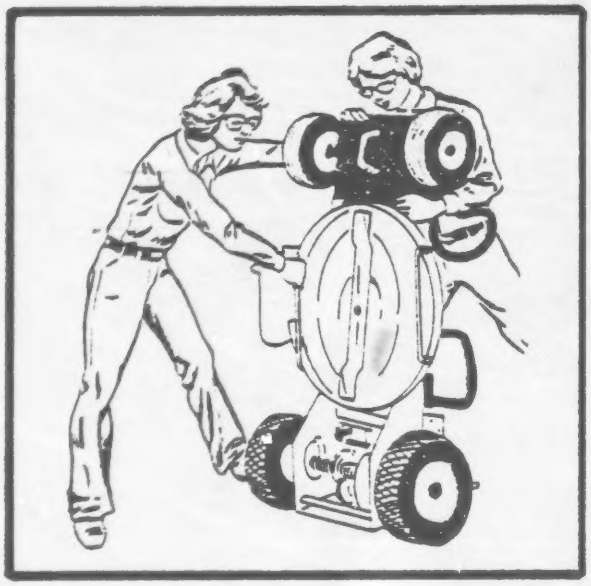
35. REPLACE FRAME SPACER BRACKET. →



CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

1. PUT BELT ON ALL PULLEYS
2. REPLACED BELT IDLER ARM GUIDE
3. REPLACED MOWER COVER.
4. REPLACED DRIVE TENSION SPRING.
5. REPLACED FRAME SPACER BRACKET.

36. PUT MOWER DOWN ON ALL 4 WHEELS. →



37. PUT GAS IN TANK.

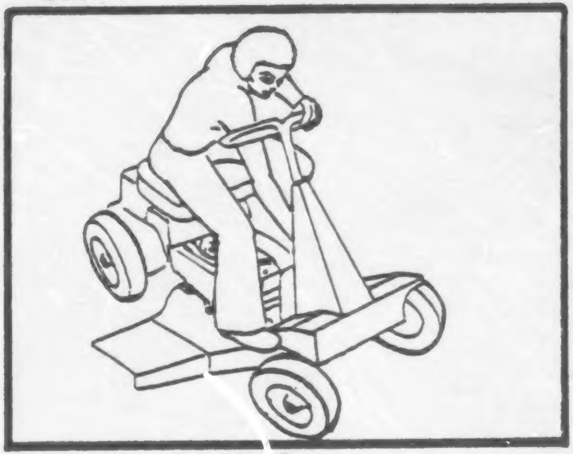
"TURN THE PAGE"

JOB STEPS

READ:

LOOK:

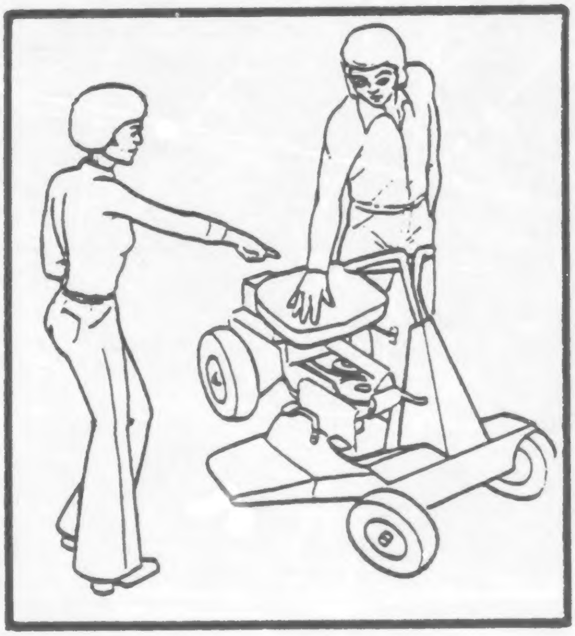
38. START MOWER AND BE SURE IT GOES FORWARD AND IN REVERSE.



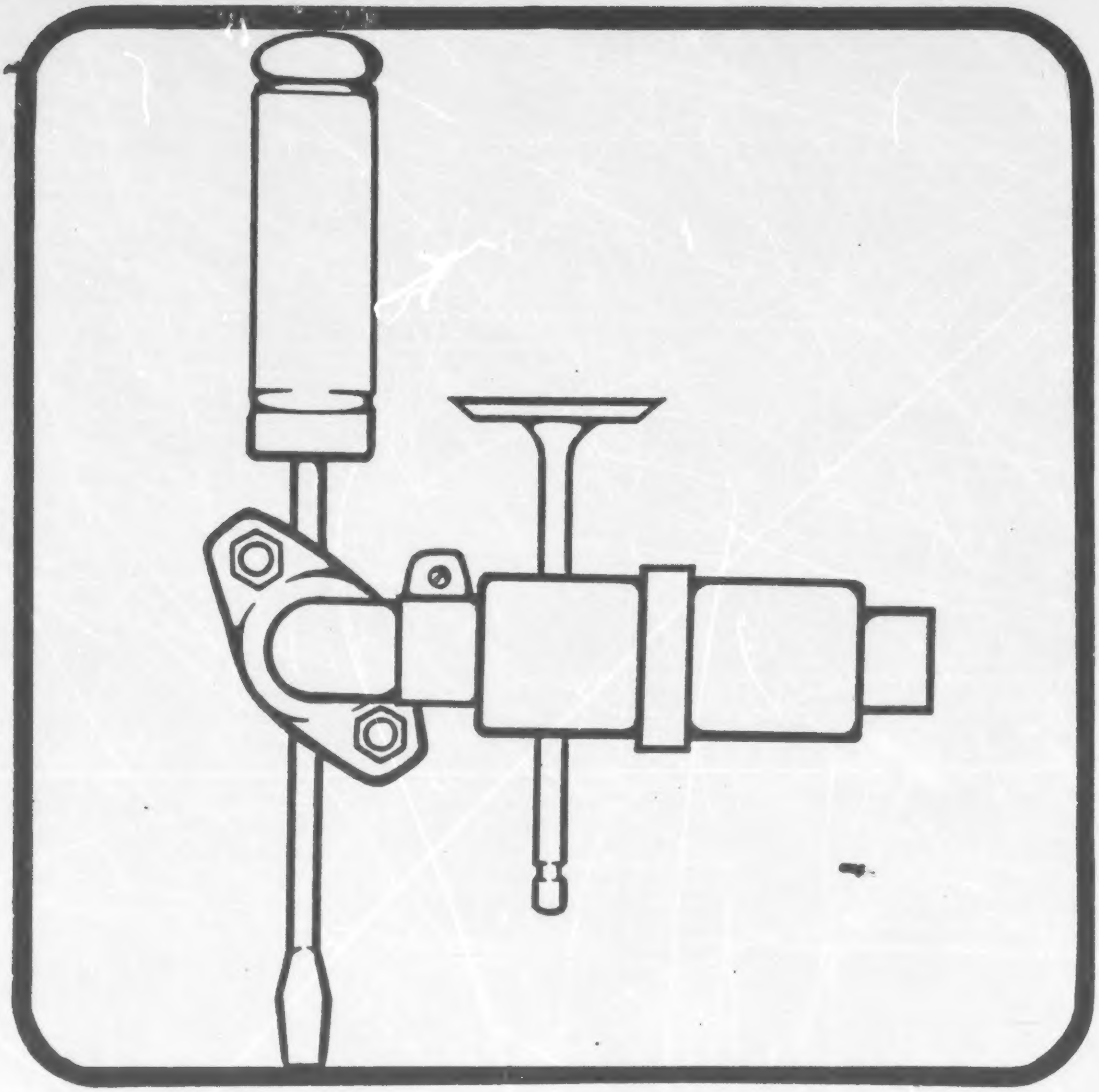
CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

1. PLACED MOWER ON ITS WHEELS.
2. PUT IN GAS.
3. MADE SURE MOWER GOES FORWARD AND IN REVERSE.

39. HAVE YOUR INSTRUCTOR HELP YOU CHECK TO BE SURE BLADES ARE WORKING.



40. CLEAN UP YOUR AREA.



small engine repair

unit: ENGINE BLOCK MACHINING AND TOOLS

capital area career center

module: 7501 16 001 1
7501 16 001 3 date: JANUARY 1978 level: I

skill title: HOW TO INSTALL A HELI-COIL KIT

developed & written by: DANIEL M. WOODWARD & HARRY WRIGHT

visuals by: DAVE WEHRWEIN

WORD GUIDE

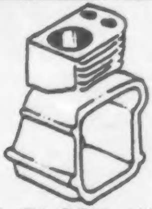
DAMAGED - RUINED

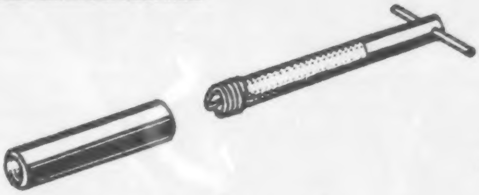
PERFORMANCE OBJECTIVE

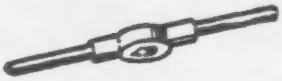
YOU ARE GOING TO LEARN:

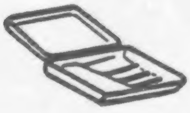
HOW TO PUT A HELI-COIL ON THE ENGINE BLOCK.

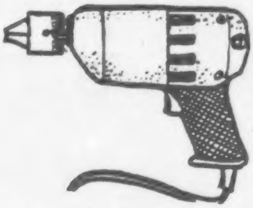
AND IN ORDER TO DO THIS YOU WILL NEED:


ENGINE BLOCK WITH A STRIPPED, THREADED HOLE


HELI-COIL KIT


TAP HANDLE


DRILL SET


ELECTRIC DRILL

PLIERS

SAFETY GLASSES

WE WILL KNOW YOU CAN DO IT WHEN:

1. YOU HAVE GATHERED YOUR EQUIPMENT.
2. YOU HAVE SAFELY COMPLETED THE JOB STEPS.
3. YOU HAVE PUT IN A HELI-COIL INTO A HOLE WITH DAMAGED THREADS SO IT CAN BE USED.

TURN THE PAGE

WORD GUIDE

REPLACES - TAKES THE PLACE OF

INFORMATION

ENGINE BLOCKS HAVE MANY KINDS OF HOLES IN THEM INTO WHICH THINGS ARE SCREWED. IT COULD BE A SPARK PLUG OR BOLTS. SOMETIMES THE THREADS GET RUINED. THIS IS CALLED "STRIPPING" THE THREADS. THIS IS LIKE A BREAK IN THE THREADS. THIS MEANS THAT WHATEVER IS TO BE HELD IN, WILL NOT BE ABLE TO STAY IN TIGHT ENOUGH.

THE WAY WE REPAIR THE STRIPPED HOLE IS WITH A HELI-COIL. THIS IS A MANUFACTURER'S TRADE NAME FOR THE PART WHICH REPLACES OR REPAIRS A WORN OR DAMAGED THREAD.

A HELI-COIL IS USED WHEN WE CANNOT USE A REGULAR OR STANDARD TAP AND DRILL. WE COULD USE ONE WHEN WE STRIP A SPARK PLUG HOLE OR SOME SPECIAL PART WHERE THE THREAD MUST STAY THE SAME.

TURN THE PAGE

WORD GUIDE

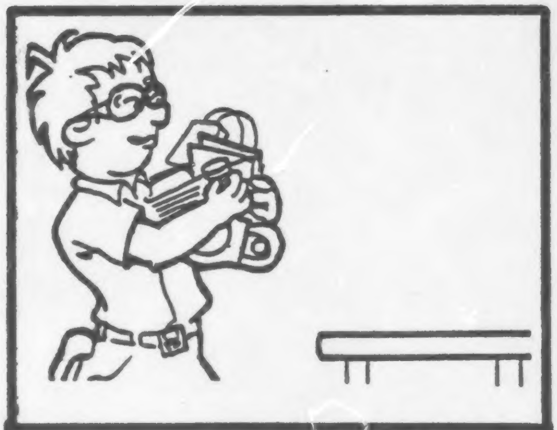
CHUCK - A PART ON A DRILL WHICH HOLDS THE WORKPIECE.

JOB STEPS

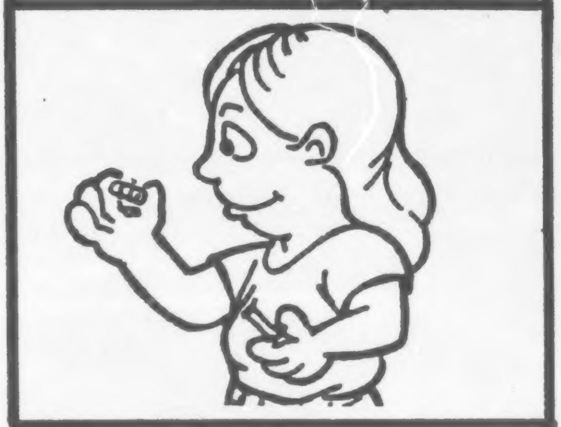
READ: LOOK:

1. GET ALL YOUR EQUIPMENT AND GO TO YOUR WORK AREA.

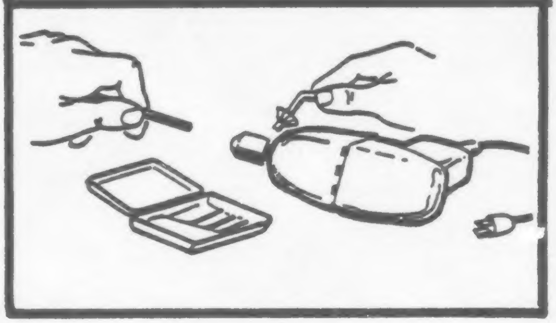
2. PUT ON YOUR SAFETY GLASSES.



3. FIND OUT THE SIZE OF THE DAMAGED THREADS ON THE BOLT.



4. NOW FIND A DRILL BIT OF THAT SAME SIZE (1/4" DRILL BIT IF A 1/4 INCH BOLT; 5/16" BIT IF A 5/16 INCH BOLT) AND PUT THE BIT INTO THE CHUCK OF THE ELECTRIC DRILL.

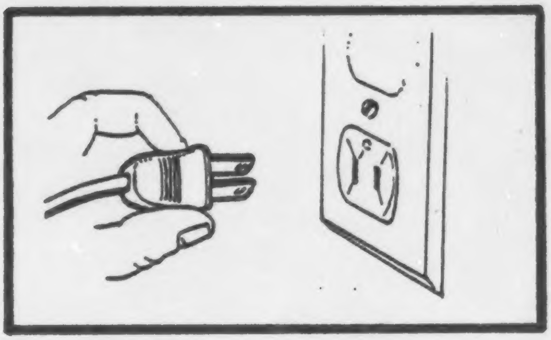


TURN THE PAGE

JOB STEPS

READ: LOOK:

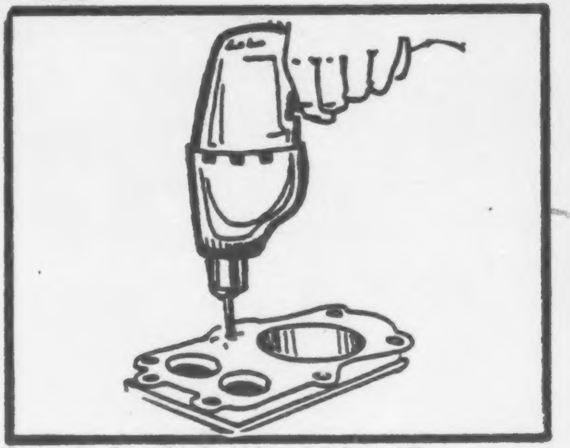
5. PLUG IN THE ELECTRIC DRILL. →



CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

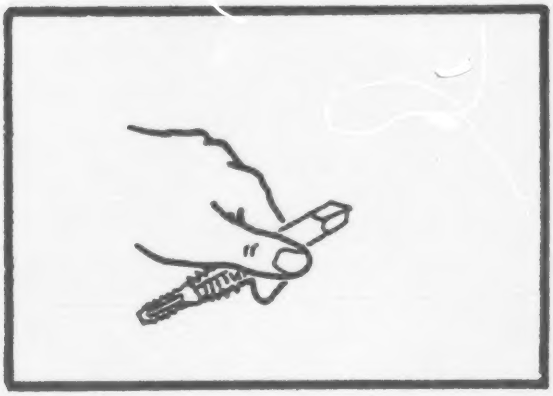
1. THE RIGHT SIZE DRILL BIT.
2. THE BIT TIGHT IN THE DRILL.
3. THE DRILL PLUGGED IN.

6. PUT THE DRILL BIT INTO THE HOLE AND DRILL OUT THE OLD OR RUINED THREADS. →



CHECK: ASK YOUR INSTRUCTOR TO CHECK THE HOLE YOU DRILLED.

7. FIND A HELI-COIL TAP OF THE SAME SIZE BOLT YOU WANT TO REPLACE. →



TURN THE PAGE

WORD GUIDE

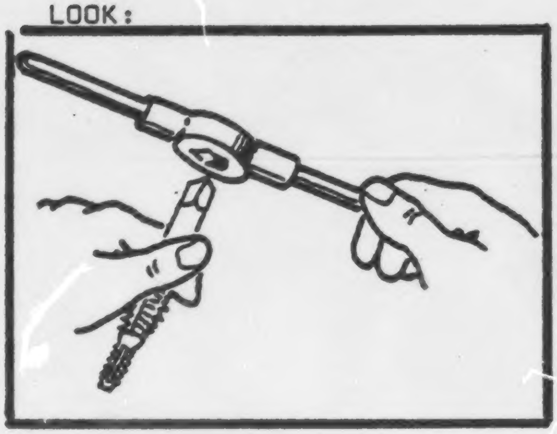
INSERTER - A TOOL USED TO PUT ONE THING INSIDE OF SOMETHING

JOB STEPS

READ:

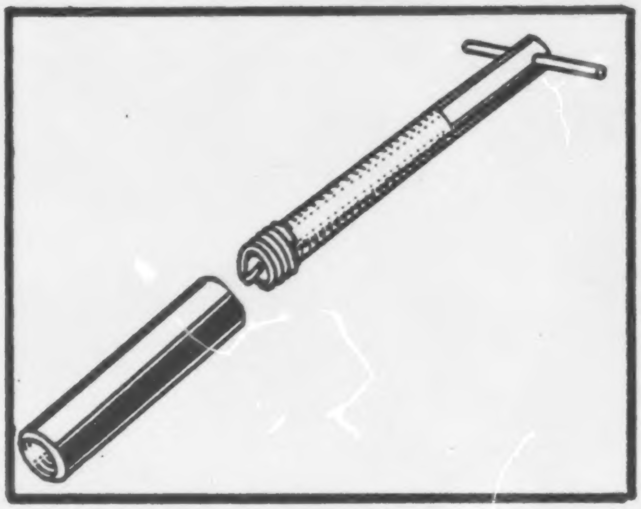
LOOK:

8. GET YOUR TAP-WRENCH HANDLE AND TIGHTEN THE TAP INTO IT.



9. PUT THE TAP INTO THE HOLE AS DEEP AS THE LENGTH OF THE HELI-COIL.

10. PICK OUT THE CORRECT HELI-COIL AND HELI-COIL INSERTER. THREAD THE HELI-COIL ONTO THE INSERTER.



CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

1. THE RIGHT HELI-COIL TAP.
2. PUT THE TAP ON THE TAP-WRENCH HANDLE.
3. THE TAP IN THE HOLE.
4. PICKED OUT THE RIGHT HELI-COIL AND INSERTER.

NOTE: BE SURE THE TANG OF THE COIL IS SEATED ON THE DRIVE HOOK.

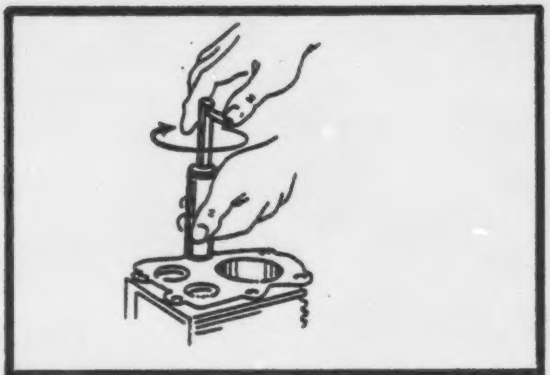
TURN THE PAGE

JOB STEPS

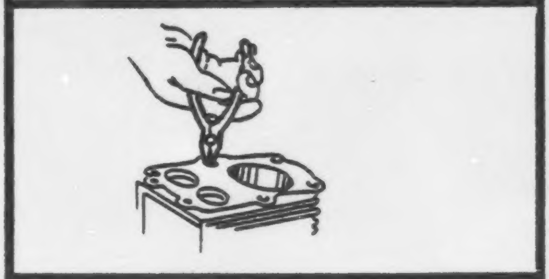
READ:

LOOK:

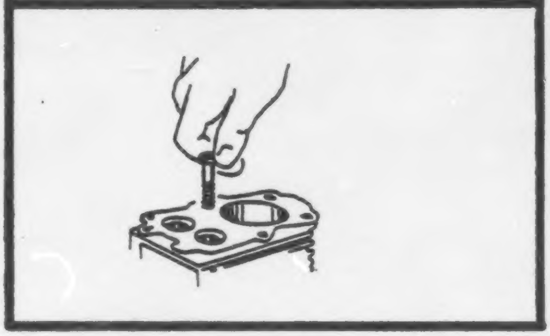
11. TURN THE HELI-COIL INTO THE TAPPED HOLE UNTIL IT IS FLUSH OR FLAT AGAINST THE ENGINE BLOCK.



12. WITH YOUR BREAK-OFF TOOL, TWIST THE TANG AND BREAK IT OFF FROM THE COIL.



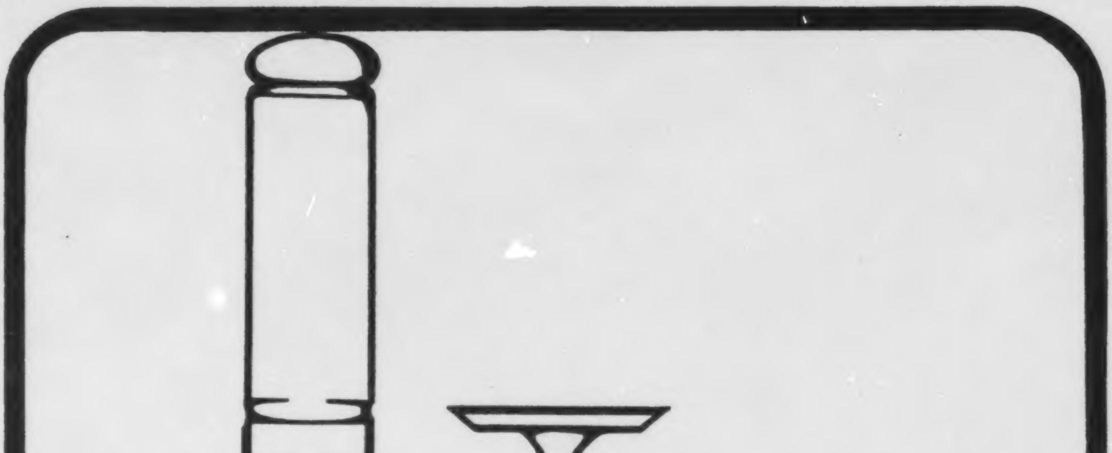
13. GET A NEW BOLT AND SCREW IT INTO THE THREADS. CHECK FOR THE RIGHT FIT.



CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

1. PUT IN THE HELI-COIL IN THE RIGHT WAY.
2. BROKEN OFF THE TANG FROM THE COIL.
3. THE RIGHT FIT FOR THE NEW BOLT.

14. RETURN ALL YOUR EQUIPMENT TO THE PROPER PLACES.



small engine repair

unit: ENGINE BLOCK MACHINING

capital area career center

module: 7501 16 002 1
7501 16 002 3 **date:** AUGUST 1977 **level:**

skill title: DRILLING, REMOVING AND TAPPING BROKEN STUDS

developed & written by: DWIGHT SMITH

visuals by: DAVE WEHRWEIN

WORD GUIDE

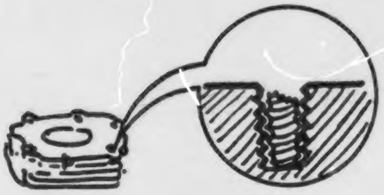
STUD - A THREADED BOLT WITHOUT A HEAD THAT IS SCREWED INTO SOMETHING AND IS USED AS SOMETHING ON WHICH TO SCREW A NUT.

PERFORMANCE OBJECTIVE

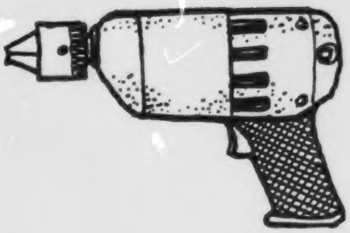
YOU ARE GOING TO LEARN:

HOW TO REMOVE A BROKEN STUD AND RE-TAP THE HOLE.

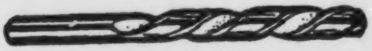
AND IN ORDER TO DO THIS YOU WILL NEED:



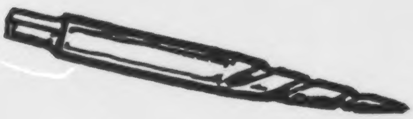
A PART WITH A STUD BROKEN OFF AT OR BELOW THE SURFACE



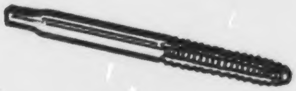
DRILL MOTOR



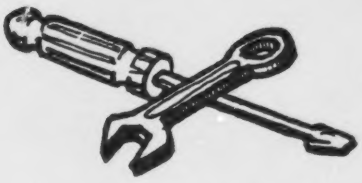
DRILL BIT INDEX



"EASY OUT" SET



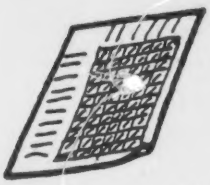
TAP AND DIE SET



HAND TOOLS

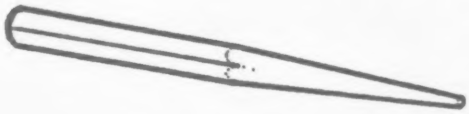
TAPPING FLUID

TAPPING FLUID

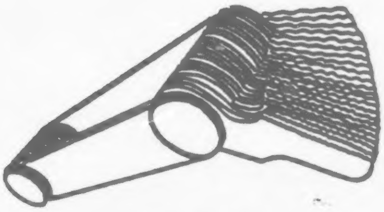


TAP DRILL SIZE CHART

"TURN THE PAGE"



CENTER PUNCH



THREAD GAUGE

WE WILL KNOW THAT YOU CAN DO IT WHEN:

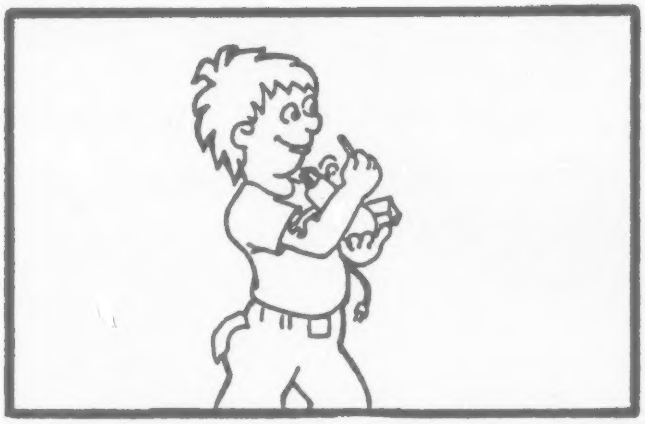
1. YOU HAVE GATHERED THE TOOLS AND EQUIPMENT FOR THIS MOD.
2. YOU HAVE REMOVED THE BROKEN STUD AND RE-TAPPED THE HOLE SO THAT IT CAN ACCEPT ANOTHER STUD.
3. YOU HAVE CLEANED UP THE WORK AREA AND PUT AWAY THE EQUIPMENT CORRECTLY.

"TURN THE PAGE"

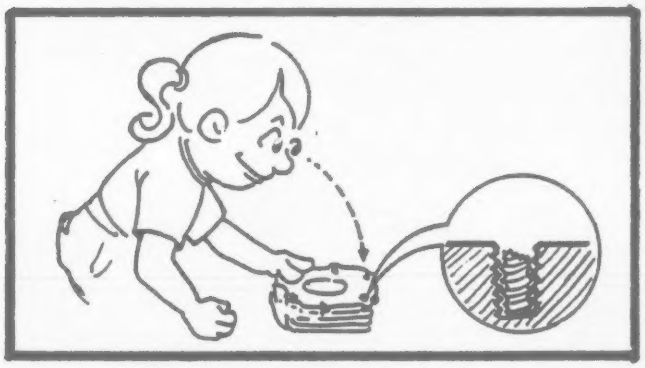
JOB STEPS

READ: LOOK:

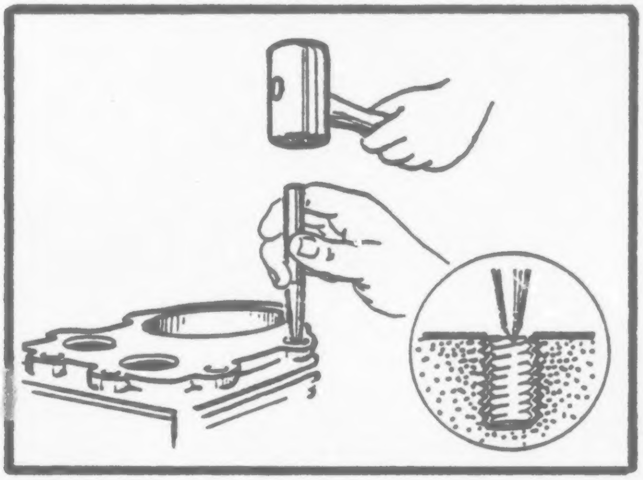
1. TAKE THE EQUIPMENT AND SUPPLIES TO YOUR WORK AREA.



2. LOOK CAREFULLY AT THE PART WITH THE BROKEN STUD. TRY TO GUESS HOW DEEP THE STUD GOES. THEN, MEASURE THE WIDTH OF THE STUD.



3. USING THE CENTER PUNCH, PUNCH THE END OF THE STUD.



CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

A. ALL THE EQUIPMENT AND SUPPLIES FOR THE MOD.
B. GUESSED THE DEPTH AND WIDTH OF THE STUD.
C. CENTER-PUNCHED THE CENTER OF THE BROKEN STUD.

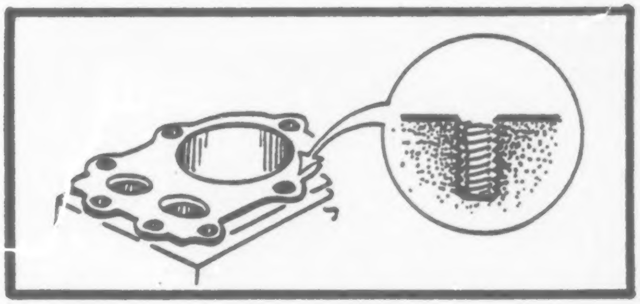
4. IF THE STUD STICKS OUT AT ALL, FILE IT FLAT.

"TURN THE PAGE"

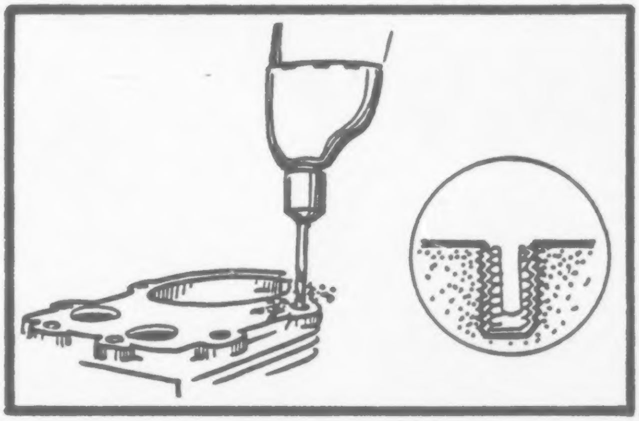
JOB STEPS

READ: LOOK:

5. ASK YOUR INSTRUCTOR WHAT SIZE "EASY OUT" TO USE, AND WHAT SIZE DRILL BIT TO USE FOR IT.

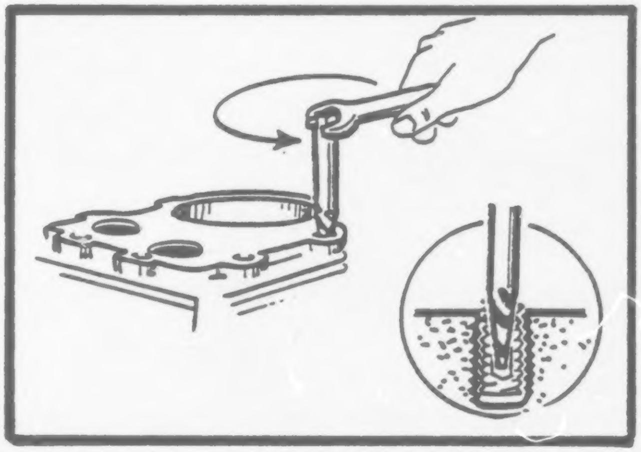


6. PUT THE BIT IN THE CHUCK OF THE DRILL AND USE THE DRILL SET TO DRILL INTO THE STUD ABOUT 3/4 OF THE WAY DOWN.

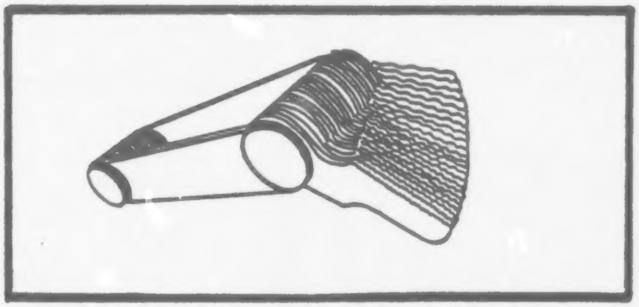


7. USING A WRENCH, TURN THE "EASY OUT" INTO THE STUD. BE SURE TO TURN THE "EASY OUT" TO THE LEFT. WHEN IT GETS TO THE BOTTOM OF THE HOLE, IT TIGHTENS UP AND TWISTS OUT THE BROKEN STUD.

NOTE: IF THE "EASY OUT" IS TAPERED, TAP IT INTO THE HOLE, FIRST.



8. USING THE THREAD GUAGE, CHECK WHAT SIZE THREADS ARE IN THE HOLE. ASK YOUR INSTRUCTOR TO HELP YOU, IF NECESSARY.



"TURN THE PAGE"

JOB STEPS

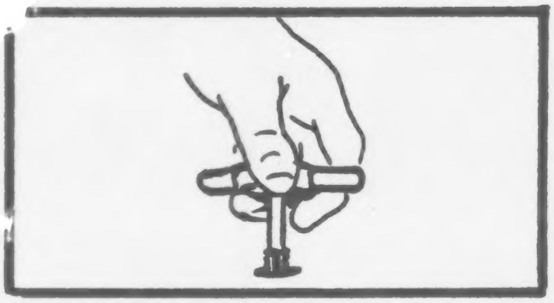
READD: LOOK:

CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

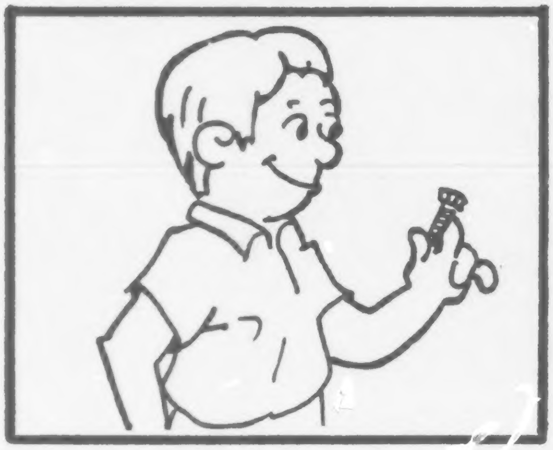
A. DRILLED THE STUD.
B. USED THE "EASY OUT" IN THE STUD.
C. CHECKED THE THREAD SIZE OF THE STUD.

9. FIND THE PROPER SIZE TAP FOR THE THREADS. USING THE TAP AND TAPPING FLUID, CLEAN UP THE THREADS IN THE HOLE.

NOTE: CHECK THE TAPPING FLUID CONTAINER FOR A LIST OF METALS FOR WHICH IT IS USED. ALUMINUM NEEDS SPECIAL FLUID.

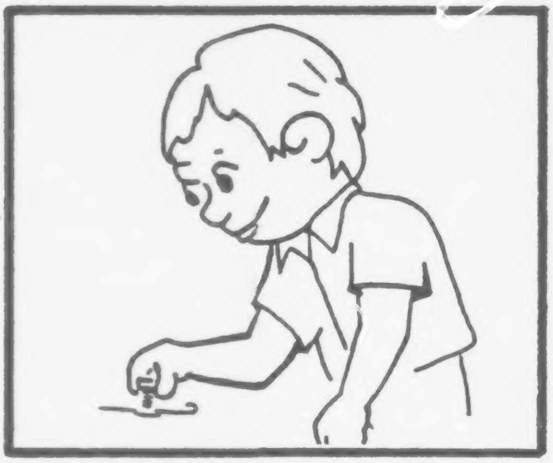


10. GET A BOLT OR STUD OF THE SAME THREAD SIZE AS THE HOLE.



11. TURN IT IN ALL THE WAY TO CHECK THE RE-TAPPED HOLE FOR SMOOTH THREADS.

12. REMOVE THE BOLT OR STUD.



"TURN THE PAGE"

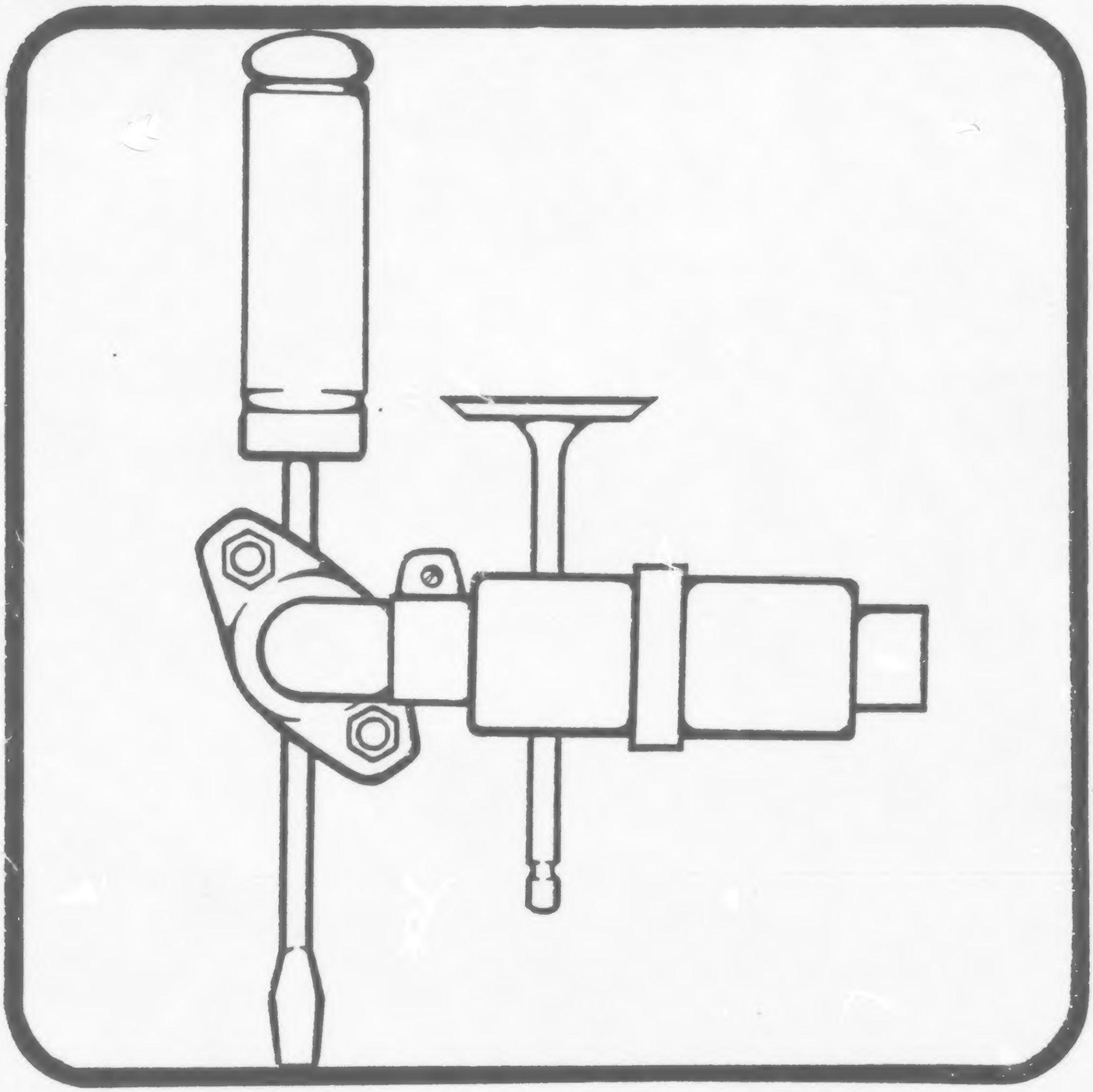
JOB STEPS

READ: LOOK:

CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

A. RE-TAPPED THE HOLE, USING TAPPING FLUID.
B. CHECKED THE THREADS AFTER TAPPING.
C. CLEANED UP YOUR WORK AREA AND PUT TOOLS AWAY.

13. PUT AWAY THE EQUIPMENT AND TOOLS IN THE RIGHT PLACES.



small engine repair

unit: ENGINE BLOCK MACHINING AND TOOLS

capital area career center

module: 7501 16 003 1
7501 16 003 3 **date:** DECEMBER 1977 **level:** I

skill title: CYLINDER HONES - HOW TO IDENTIFY THEM AND HOW THEY ARE ASSEMBLED

developed & written by: JIM PITTS AND DWIGHT SMITH

visuals by: DAVE WEHRWEIN

WORD GUIDE

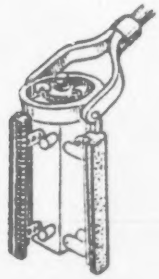
HONE - ROUGH STONE-LIKE SURFACE USED TO SMOOTH AND POLISH METAL.

PERFORMANCE OBJECTIVE

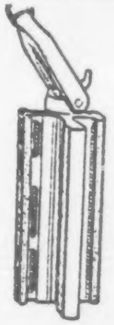
YOU ARE GOING TO LEARN:

1. HOW TO TELL AN AND JN HONES APART.
2. WHAT EACH HONE DOES.
3. WHAT THE DIFFERENT STONES ARE AND WHAT GRIT THEY ARE.
4. HOW TO PUT THE HONES TOGETHER.

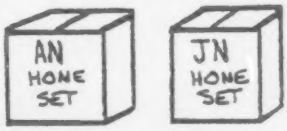
IN ORDER TO DO THIS YOU WILL NEED:



AN HONE



JN HONE



HONE STONE SETS

MANV.
MANUAL

MANUFACTURER'S INSTRUCTIONS

WE WILL KNOW YOU CAN DO IT WHEN:

1. YOU HAVE GATHERED THE EQUIPMENT FOR THIS MODULE.
2. YOU HAVE READ THE JOB STEPS.
3. YOU CAN EXPLAIN THE DIFFERENCE BETWEEN AN AN AND JN HONE.
4. YOU CAN TELL WHAT EACH HONE DOES.
5. YOU CAN TELL WHAT THE DIFFERENT STONES ARE.
6. YOU HAVE PUT THE HONES TOGETHER IN THE RIGHT WAY.
7. YOU HAVE PUT AWAY ALL TOOLS.

"TURN THE PAGE"

JOB STEPS

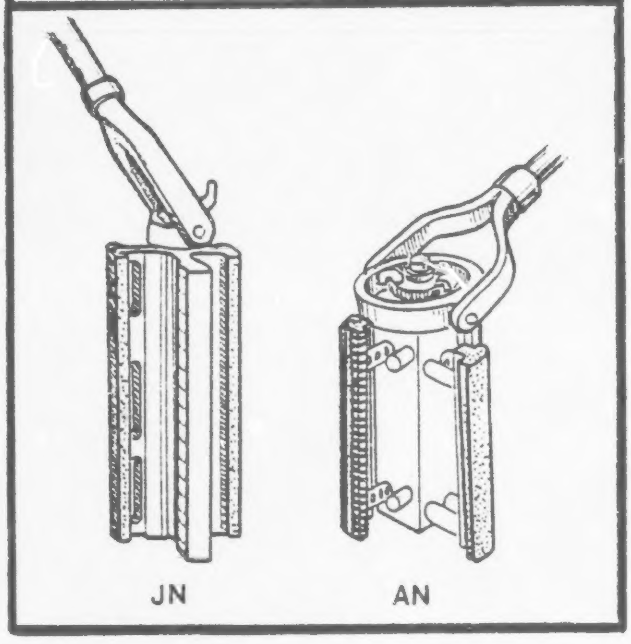
READD:

LOOK:

1. GET ALL THE EQUIPMENT FOR THIS MODULE.

2. GO TO THE WORK AREA.

3. STUDY THE PICTURES OF THE HONES AND LOOK CAREFULLY AT THE HONES YOU HAVE.



4. NOTICE THAT THE TWO HONES ARE DIFFERENT. THE AN HONE IS FOR SMALLER CYLINDERS. THE JN HONE IS FOR LARGER CYLINDERS. THE TWO DIFFERENT KINDS ARE PUT TOGETHER DIFFERENTLY.

5. NOTICE THAT HONES ARE USED TO SMOOTH OUT THE INSIDE OF A CYLINDER. THIS TAKES OUT ANY SCORE LINES OR ROUGHNESS THAT WOULD DAMAGE NEW RINGS OR PISTON.

"TURN THE PAGE"

WORD GUIDE

COURSENESS - ROUGHNESS
FINENESS - SMOOTHNESS

JOB STEPS

READ:

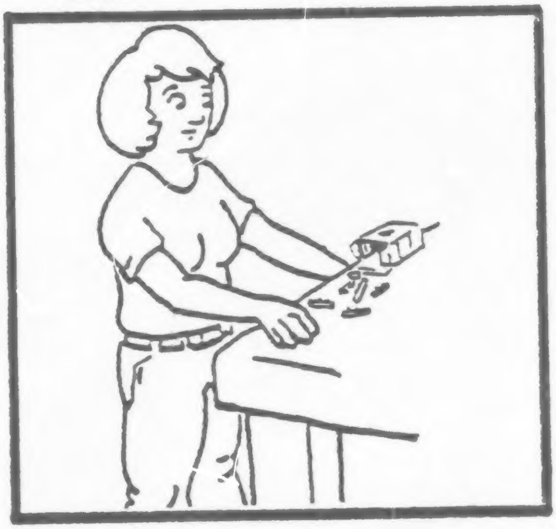
6. NOTICE THAT THERE ARE TWO KINDS OF STONES USED IN HONES (STONES ARE THE ROUGH SURFACES THAT SMOOTH OUT THE METAL):

A. WET STONES - THIS TYPE NEEDS A LUBRICANT LIKE OIL OR KEROSENE.

B. DRY STONES - THIS TYPE NEEDS NO EXTRA LUBRICANT.

NOTE: THE MANUFACTURER'S INSTRUCTIONS WILL TELL YOU IF YOU NEED TO USE A LUBRICANT OR NOT.

LOOK:



CHECK: TEST YOUR KNOWLEDGE WITH QUIZ I (PUT ANSWERS ON A SEPARATE SHEET OF PAPER). THE ANSWERS ARE ON THE LAST PAGE OF THIS MOD.

1. A JN HONE IS FOR ____________ CYLINDERS.

   A. LARGER B. SMALLER C. SQUARE D. JAPANESE

2. DRY STONES NEED __________ LUBRICANT.

   A. LOTS OF B. NO C. KEROSENE D. OIL

3. HONES ARE USED TO _________.

   A. THROW B. SMOOTH OUT CYLINDERS C. REBUILD BRAKES
   D. SMOOTH OVER MISTAKES

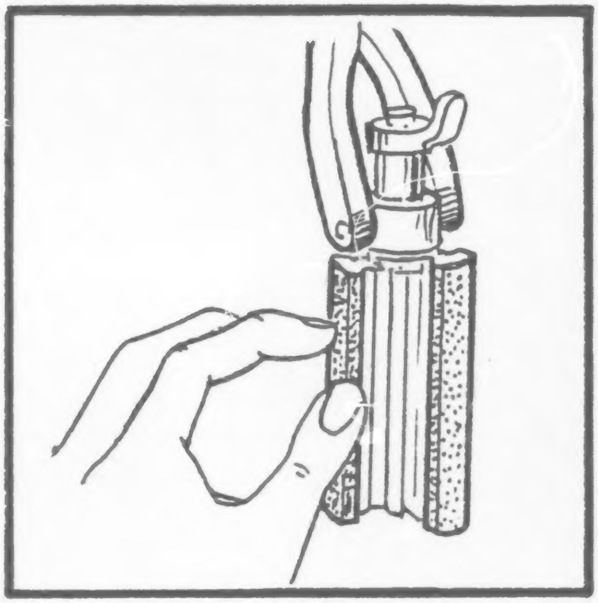
4. AN AND JN HONES ARE PUT TOGETHER ___________.

   A. THE SAME B. CARELESSLY C. EASILY D. DIFFERENTLY

"TURN THE PAGE"

JOB STEPS

READ: LOOK:



7. FEEL THE GRIT ON YOUR STONES. GRIT IS THE COARSENESS OR FINENESS OF AN ABRASIVE. ABRASIVES ARE THINGS LIKE SANDPAPER OR A FILE THAT ARE USED TO REMOVE SMALL AMOUNTS OF MATERIALS AND LEAVE A SMOOTH FINISH.

COARSE GRIT STONES ARE USED FOR CAST IRON OR STEEL CYLINDERS. FINE GRIT STONES CAN ALSO BE USED ON STEEL OR IRON TO GIVE A SMOOTH FINISH.

VERY FINE STONES MUST BE USED FOR ALUMINUM CYLINDERS. A LUBRICANT IS ALWAYS USED WHEN HONING ALUMINUM CYLINDERS.

8. LEARN THESE FACTS ABOUT JN HONES:

JN 100 - COARSE STONE
JN 200 - FINE STONE
JN 300 - VERY FINE STONE

9. LEARN THESE FACTS ABOUT AN HONES:

AN 100 - COARSE STONE
AN 200 - FINE STONE
AN 300 - VERY FINE STONE

CHECK: TEST YOURSELF WITH QUIZ II. PUT ANSWERS ON A SEPARATE SHEET OF PAPER. THE ANSWERS ARE ON THE LAST PAGE OF THIS MODULE.

1. THE ROUGHNESS OR SMOOTHNESS OF A HONE STONE IS CALLED _____.

A. SANDPAPER B. KIT C. GRIT D. ROCK

2. YOU MUST USE A LUBRICANT WHEN HONING _______ CYLINDERS.

A. SQUARE B. FORD C. ALUMINUM D. PLASTIC

3. FOR A SMALL, ALUMINUM CYLINDER, YOU WOULD USE A __________ HONE STONE.

A. JN 100 B. JN 300 C. AN 500 D. AN 100

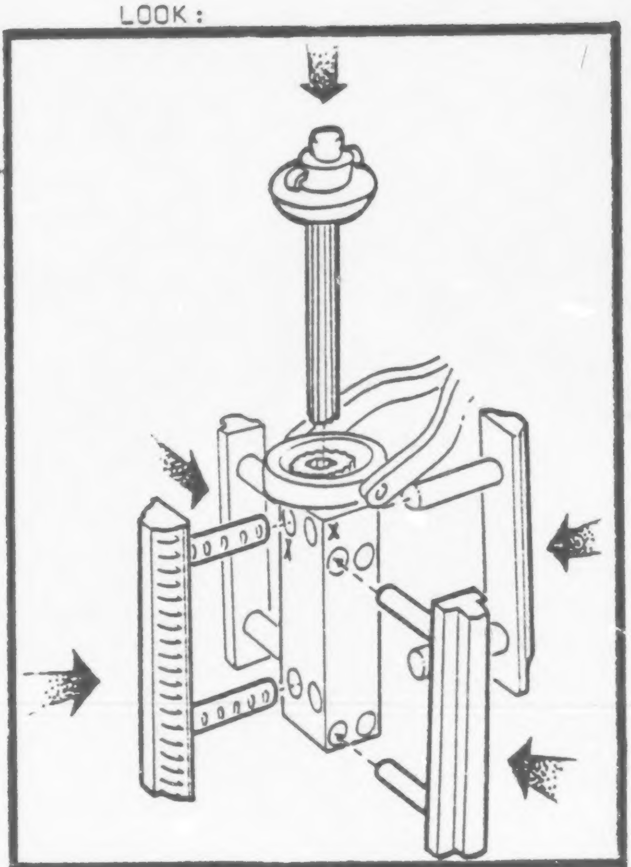
"TURN THE PAGE"

JOB STEPS

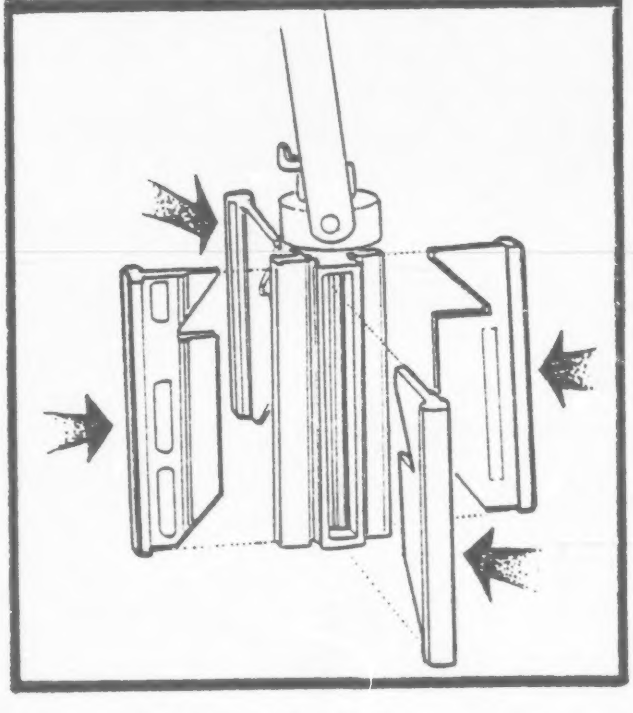
READ:

LOOK:

10. FOLLOW THE INSTRUCTIONS ON THE BOX TO PUT TOGETHER THE JN HONE. LOOK AT THE PICTURE TO SEE HOW THE STONES FIT IN. →



11. FOLLOW THE INSTRUCTIONS ON THE BOX TO PUT TOGETHER THE AN HONE. USE THIS PICTURE TO HELP YOU. →



"TURN THE PAGE"

JOB STEPS

READAD:

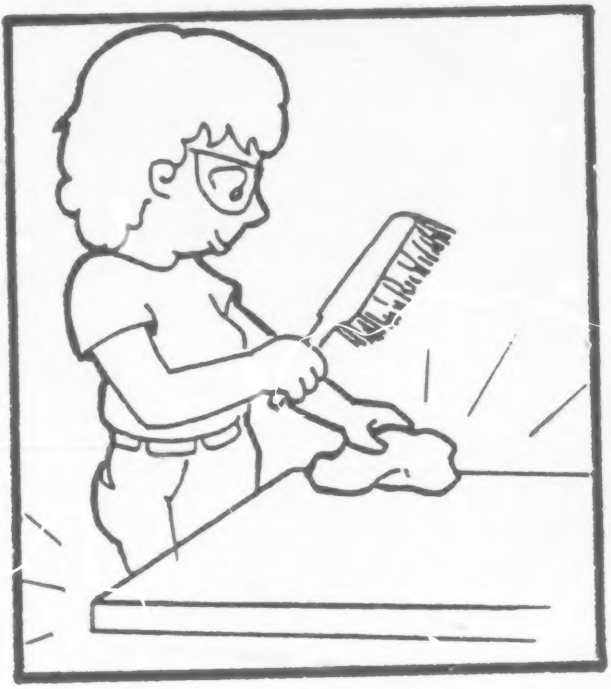
LOOK:

CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

1. PUT THE JN HONE TOGETHER PROPERLY.
2. PUT THE AN HONE TOGETHER PROPERLY.

BE PREPARED TO ANSWER QUESTIONS ABOUT THE TWO KINDS OF HONES AND WHICH IS USED FOR CAST IRON AND ALUMINUM.

12. PUT AWAY ALL THE EQUIPMENT AND CLEAN UP THE WORK AREA. →



"TURN THE PAGE"

ANSWERS TO QUIZ I

1. A
2. B
3. B

ANSWERS TO QUIZ II

1. C
2. C
3. C

small engine repair

unit: ENGINE BLOCK MACHINING AND TOOLS

capital area career center

module: 7501 16 004 1
7501 16 004 3

date: 7/77 **level:** I

skill title: HOW TO REBORE CYLINDERS USING HONES JN AND AN MODELS

developed & written by: HARRY WRIGHT

visuals by: DAVE WEHRWEIN

WORD GUIDE

HONE - TO MAKE A SURFACE EVEN AND SMOOTH

LUBRICANT - KEEPS THE STONES FROM PLUGGING UP

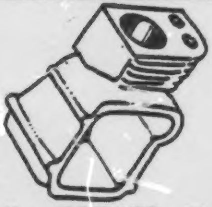
OLEUM - HEAVY, OILY LIQUID USED TO RINSE METAL PARTS

PERFORMANCE OBJECTIVE

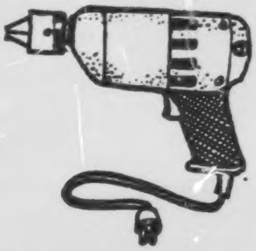
YOU ARE GOING TO LEARN:

HOW TO HONE CYLINDERS USING MODEL JN OR AN HONES.

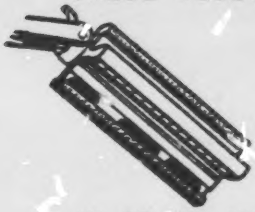
AND IN ORDER TO DO THIS YOU WILL NEED:



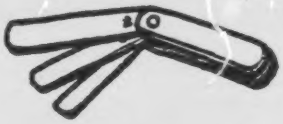
A BLOCK; EITHER ALUMINUM STEEL SLEEVE, OR CAST IRON



1/2" DRILL MOTOR ON A DRILL PRESS



JN OR AN HONE SET



FEELER GAUGES

C-CLAMP

LUBRICANT

WIRE BRUSH

CLEAN CLOTH

OLEUM

A PISTON

SAFETY GLASSES

"TURN THE PAGE"

WE WILL KNOW YOU CAN DO IT WHEN:

1. YOU HAVE ALL YOUR EQUIPMENT.
2. YOU HAVE HONED THE CYLINDER SO IT IS CLEAN.
3. THE PISTON FITS PROPERLY WITH A MODEL AN OR JN HONE.

"TURN THE PAGE"

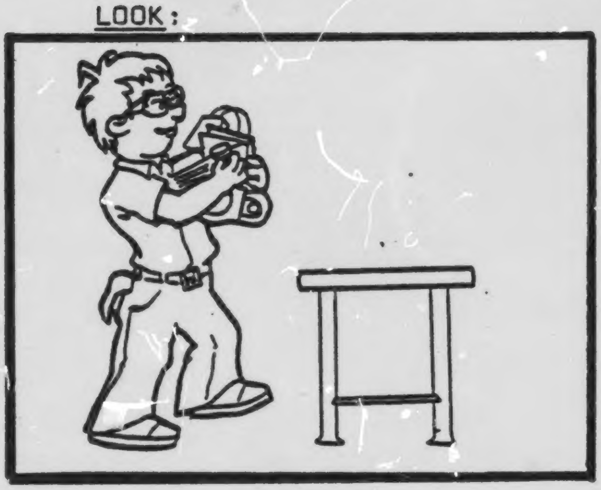
WORD GUIDE

STEEL-SLEEVE BORE - A CYLINDER-LIKE PIECE OF METAL WHICH GOES INSIDE A PISTON CYLINDER OF AN ALUMINUM ENGINE BLOCK

JOB STEPS

READ: LOOK:

1. GET ALL YOUR EQUIPMENT AND MATERIALS AND TAKE THEM TO YOUR WORK AREA.

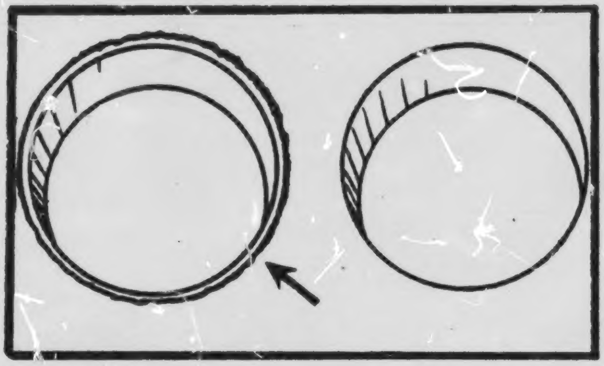


2. CHECK TO SEE WHICH KIND OF BLOCK YOU HAVE; THAT IS, WHETHER IT IS IT IS CAST IRON OR ALUMINUM.

NOTE: IF THE BLOCK IS CAST IRON, YOU DON'T HAVE TO WORRY ABOUT THE SLEEVE. IF IT IS ALUMINUM, THEN YOU HAVE TO SEE IF IT HAS A STEEL-SLEEVE BORE OR AN ALUMINUM BORE.

HERE'S HOW YOU DO THIS:

A. LOOK AT THE TOP OF THE CYLINDER.
B. IF IT'S DIRTY, CLEAN IT WITH YOUR WIRE BRUSH.
C. LOOK FOR A DARK RING AROUND IT. IF THE CYLINDER TOP HAS A DARK RING, THEN IT HAS A STEEL-SLEEVE BORE.



USING LUBRICANT: STEEL AND CAST IRON IS HONED DRY AND THESE STONES WILL BE RUINED IF USED WET.

"TURN THE PAGE"

WORD GUIDE

ADJUSTING - TO TURN INWARD OR OUTWARD FOR PROPER FIT

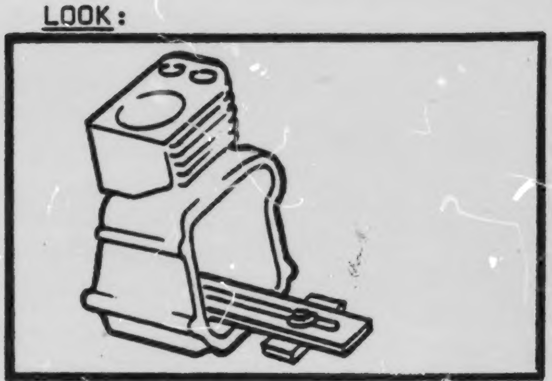
JOB STEPS

READ:

LOOK:

3. VERY CAREFULLY, CLAMP THE BLOCK DOWN TO YOUR WORK TABLE WITH YOUR C-CLAMP. HAVE THE INSTRUCTOR CHECK THE BLOCK BEFORE YOU CLAMP IT VERY TIGHTLY BECAUSE IF THE BLOCK ISN'T SITTING PROPERLY, YOU COULD BREAK THE BLOCK. →

WEAR YOUR SAFETY GLASSES.



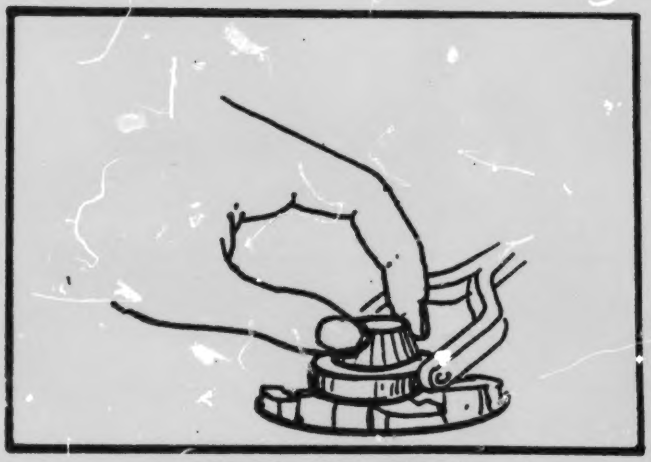
CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

1. ALL THE RIGHT EQUIPMENT.
2. THE CORRECT LUBRICANT.
3. THE RIGHT ENGINE BLOCK.
4. CHECKED PROPERLY TO SEE IF THE BLOCK IS ALUMINUM OR CAST IRON.
5. HAVE THE BLOCK CLAMPED TIGHTLY TO THE TABLE.

4. TAKE YOUR HONE SET AND PUT THE HONE INTO THE CYLINDER FAR ENOUGH SO YOU CAN STILL GET TO THE HONE ADJUSTING NUT.

5. LOOSELY TURN THE ADJUSTING KNOB TO THE RIGHT. THIS WILL SPREAD OUT THE HONING STONES TO THE CYLINDER WALLS. →

NOTE: WHEN THE HONE IS ADJUSTED PROPERLY, IT WILL DRAG EVENLY, UP AND DOWN. IT WILL NOT SHAKE OR RATTLE IN THE BORE.



"TURN THE PAGE"

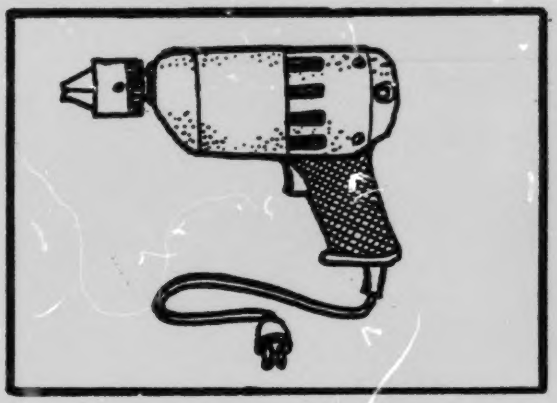
JOB STEPS

READ: LOOK:

CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

1. PUT THE HONE INTO THE CYLINDER CORRECTLY.
2. CORRECTLY ADJUSTED THE HONING STONES TO THE CYLINDER WALLS.

6. NOW GET YOUR ELECTRIC DRILL MOTOR. DO NOT PLUG IN AT THIS TIME AND DO NOT LOCK THE DRILL TRIGGER IN THE "ON" POSITION. →



7. PUT THE DRILL CHUCK ONTO THE HONE SHAFT. BE SURE THE CHUCK IS PUT ON TIGHTLY ENOUGH.

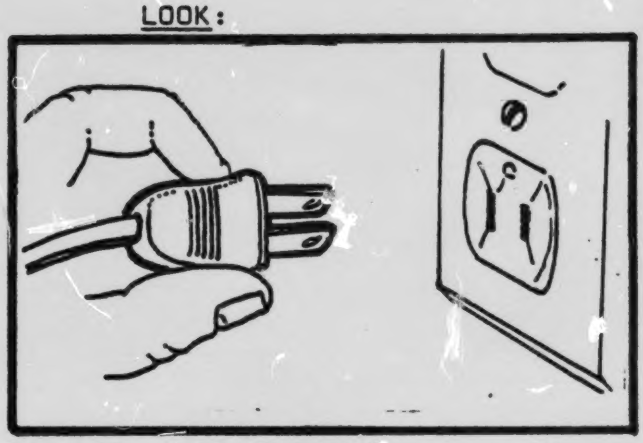
CAUTION: BE VERY CAREFUL!!!! THIS CAN BE A DANGEROUS JOB. IF THIS IS THE FIRST TIME YOU'VE TRIED THIS JOB, ASK YOUR INSTRUCTOR TO GO OVER THIS SECTION WITH YOU, BEFORE YOU START.

"TURN THE PAGE"

JOB STEPS

READ: LOOK:

8. MAKING SURE THE TRIGGER IS NOT LOCKED "ON", PLUG THE DRILL CORD INTO THE WALL. →

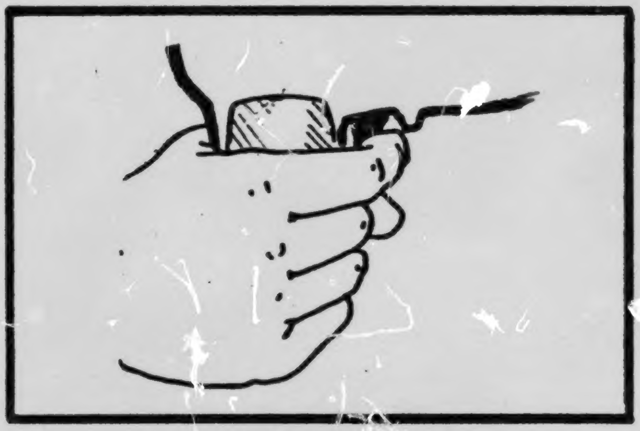


CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

1. CORRECTLY PUT THE DRILL SHAFT ONTO THE HONE SHAFT.
2. CHECKED THAT THE TRIGGER IS NOT LOCKED "ON" AND PLUGGED THE DRILL CORD INTO THE WALL.

9. KEEPING YOUR FINGER OFF THE TRIGGER OF THE DRILL, TAKE HOLD OF THE DRILL MOTOR WITH BOTH HANDS.

10. PUT YOUR FINGER ON THE TRIGGER, BUT DON'T SQUEEZE IT YET. →



"TURN THE PAGE"

WORD GUIDE

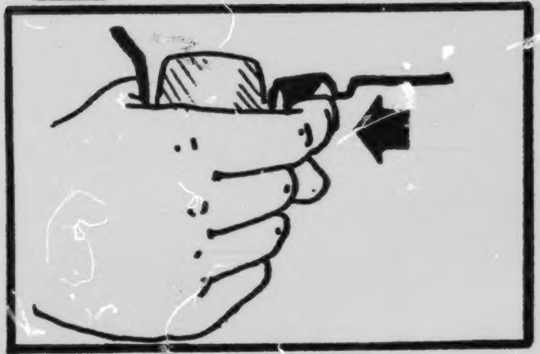
→ PRESSURE - PUSHING OR PULLING FORCE

JOB STEPS

READ:

LOOK:

11. JUST FOR A SECOND, SQUEEZE THE TRIGGER AND THEN LET GO. THIS WILL LET YOU GET THE FEEL OF THE PRESSURE OF THE STONES AGAINST THE CYLINDER WALLS. →



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WARNING!!!! IF THE PRESSURE IS TOO GREAT AGAINST THE CYLINDER WALLS, THE DRILL WILL TRY TO TURN AND TWIST OUT OF YOUR HANDS.

****

CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

1. CORRECTLY WORKED THE ELECTRIC DRILL WITH THE HONING STONES.

12. AT THIS POINT, YOU CAN HOLD THE TRIGGER "ON" AND, AT THE SAME TIME, MOVE THE DRILL UP AND DOWN.

"TURN THE PAGE"

WORD GUIDE

STROKING - UP AND DOWN MOVEMENT

DIAMETER - DISTANCE ACROSS THE CENTER OF SOMETHING

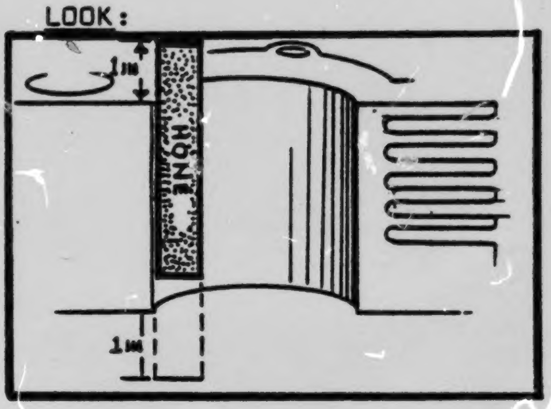
CAREFULLY - WITH CARE

JOB STEPS

READ:

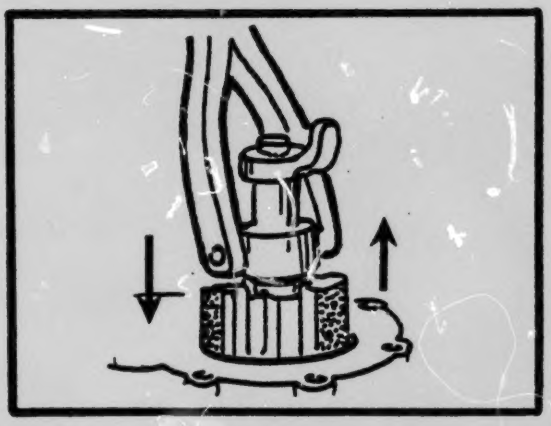
LOOK:

13. AS YOU MOVE THE HONE UP AND DOWN, DON'T LET IT COME OUT OF THE TOP OR THE BOTTOM OF THE CYLINDER MORE THAN 1 INCH.



14. BECAUSE IT IS THE LEAST WORN SECTION OF THE CYLINDER, START STROKING AT THE BOTTOM OF THE CYLINDER.

15, USE SHORT STROKES AS YOU CENTER YOUR ATTENTION ON HONING IN THE SMALLEST PART OF THE BORE. ALSO, ALLOW THE STONES TO GO THROUGH THE LOWER END OF THE BORE NO MORE THAN 1 INCH.



16. SLOWLY MAKE THE STROKES LONGER AS METAL IS REMOVED AND THE HONING STONES TOUCH HIGHER ON THE CYLINDER WALLS.

NOTE: AS YOU ARE STROKING, YOU MAY NOTICE THE DRILL SPEED SLOWING DOWN. IF THIS HAPPENS, IT MEANS THE DIAMETER IS SMALLER AND YOU SHOULD CAREFULLY WORK YOUR HONING AT THIS AREA UNTIL THE DRILL SPEED IS THE SAME OVER 75% OF THE CYLINDER LENGTH. THEN, STROKE THE FULL LENGTH OF THE CYLINDER AT A RATE OF ABOUT 30 FULL STROKES PER MINUTE.

"TURN THE PAGE"

JOB STEPS

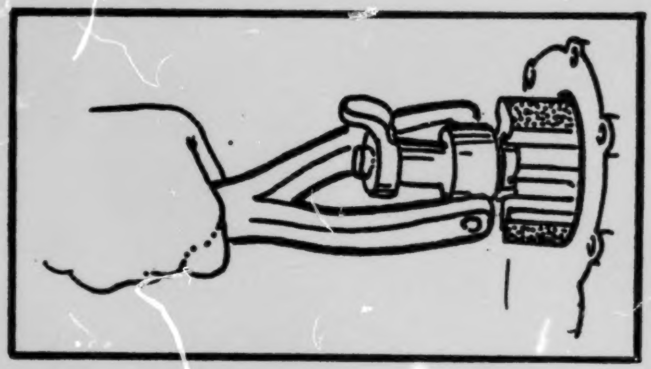
READ: **LOOK:**

17. WHEN THE BORE IS CLEAN AND THE HONE HAS AN EVEN DRAG OVER THE FULL LENGTH OF THE BORE, SHUT OFF THE DRILL.

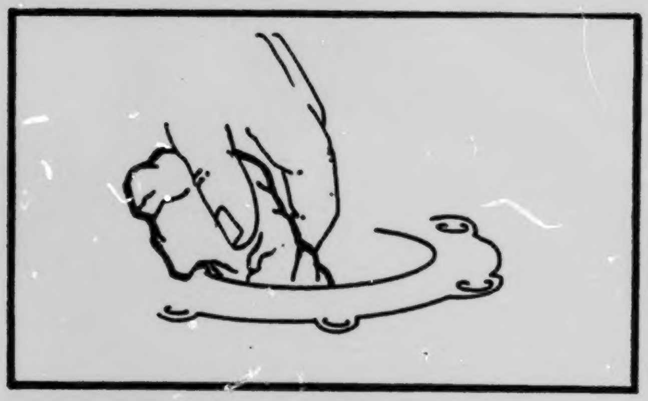
CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

1. STARTED MOVING THE DRILL UP AND DOWN, STROKING AT THE BOTTOM OF THE CYLINDER.
2. CENTERED YOUR ATTENTION ON HONING IN THE SMALLEST PART OF THE BORE, NOT ALLOWING THE STONES MORE THAN 1 INCH THROUGH THE LOWER END OF THE BORE.
3. SLOWLY MADE THE STROKES LONGER AS METAL WAS REMOVED.
4. SHUT OFF THE DRILL AT THE RIGHT TIME.

18. TAKE THE HONE OUT OF THE BORE. →



19. USING YOUR CLOTH, CLEAN OUT THE CYLINDER BORE. →

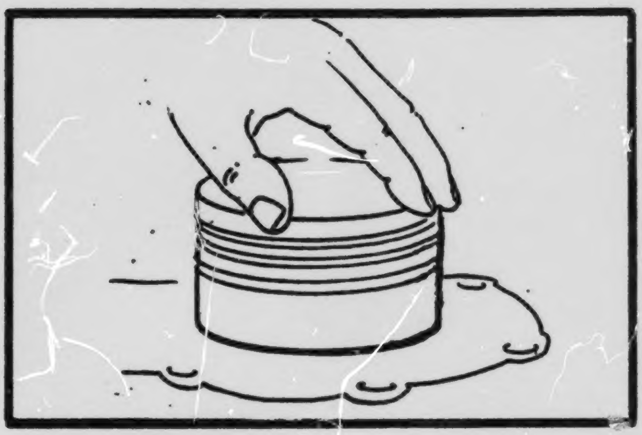


"TURN THE PAGE"

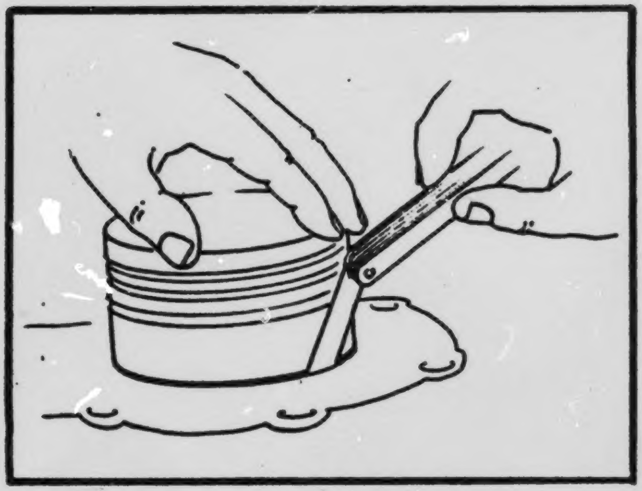
JOB STEPS

READ: LOOK:

20. TAKE YOUR PISTON AND TRY TO PUT IT INTO THE CYLINDER. →



21. IF THE PISTON GOES INTO THE CYLINDER, USING THE .003 FEELER OF YOUR FEELER GAUGE, CHECK THE SPACE BETWEEN THE SIDE OF THE PISTON AND THE CYLINDER WALL. →



NOTE:

A. IF YOU'RE USING AN ALUMINUM CYLINDER, YOU SHOULD HAVE .003 INCH SPACE BETWEEN THE CYLINDER AND THE PISTON. IF YOU DON'T, REPEAT STEPS 10 TO 17 UNTIL YOU HAVE A .003 SPACE (CALLED "SKIRT CLEARANCE) ON THE ALUMINUM CYLINDER.

B. IF YOU'RE HONING A CAST IRON OR STEEL SLEEVE, WHEN YOU REACH .003, YOU WILL HAVE TO PUT IN A FINISHING STONE SET.

CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

1. TAKEN THE HONE OUT OF THE BORE.
2. CLEANED OUT THE CYLINDER BORE.
3. TRIED TO PUT YOUR PISTON INTO THE CYLINDER.
4. CHECKED THAT YOU HAVE PROPER SPACE BETWEEN THE CYLINDER AND PISTON.

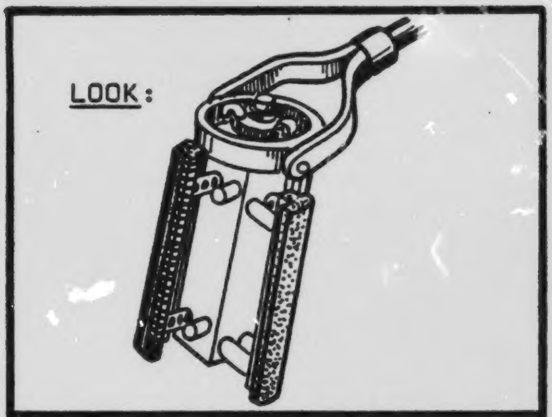
"TURN THE PAGE"

JOB STEPS

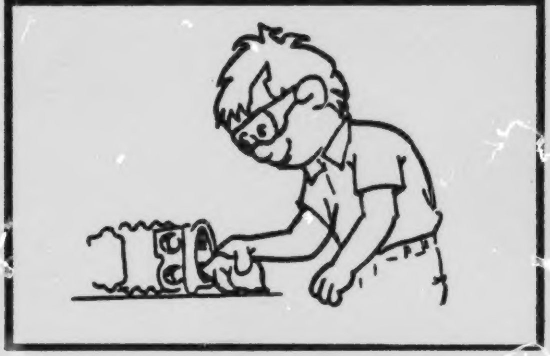
READ:

22. USING THE FINISHING STONE SET AN 200 OR JN 200, DO STEPS 10 THROUGH 19 UNTIL YOU HAVE A .005 SKIRT CLEARANCE. →

LOOK:



23. USING THE OLEUM, CLEAN THE CYLINDER AND BLOCK FULLY. YOU DO THIS BY RUNNING A CLEAN CLOTH THROUGH THE CYLINDER UNTIL IT COMES OUT CLEAN. →



24. ASK YOUR INSTRUCTOR TO OKAY THE JOB.

CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

1. USED THE FINISHING STONE SET TO REPEAT SETPS 10 THROUGH 19 UNTIL YOU HAVE A .005 PISTON SKIRT CLEARANCE.
2. CLEANED THE CYLINDER AND BLOCK WITH OLEUM AND A CLEAN CLOTH.
3. ASKED YOUR INSTRUCTOR TO CHECK AND OKAY THE JOB.

small engine repair

unit: ENGINE BLOCK MACHINING

capital area career center

module: 7501 16 005 1
7501 16 005 3 date: 8/77 level: _____

skill title: HOW TO USE A TORQUE WRENCH

developed & written by: DWIGHT SMITH

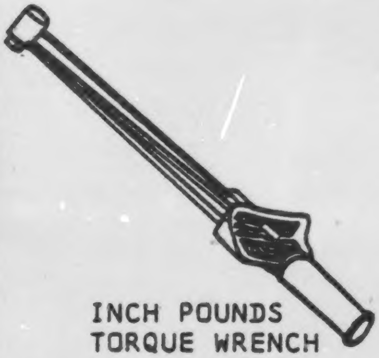
visuals by: DAVE WEHRWEIN

PERFORMANCE OBJECTIVE

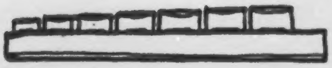
YOU ARE GOING TO LEARN:

HOW TO USE A TORQUE WRENCH TO TIGHTEN BOLTS AND NUTS.

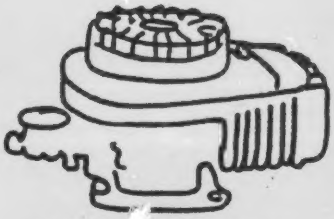
AND IN ORDER TO DO THIS YOU WILL NEED:



INCH POUNDS
TORQUE WRENCH

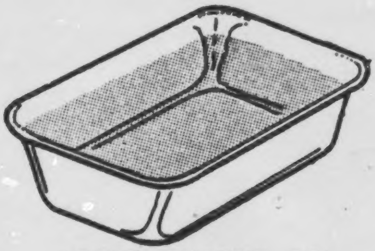


SOCKET SET TO FIT
TORQUE WRENCH DRIVE



ENGINE BLOCK
WITH HEAD IN PLACE

SERVICE MANUAL
FOR ENGINE



LIGHT ENGINE OIL
IN SMALL PAN

SAFETY GLASSES

"TURN THE PAGE"

WORD GUIDE

TORQUE - TWISTING FORCE

SPECIFICATIONS - MANUFACTURER'S DIRECTIONS OR DESCRIPTIONS.

WE WILL KNOW YOU CAN DO IT WHEN:

1. YOU HAVE GATHERED THE EQUIPMENT AND TOOLS FOR THIS MOD.
2. YOU HAVE INSTALLED THE HEAD BOLTS AND TORQUED THEM TO THE CORRECT SPECIFICATION.
3. YOU HAVE CLEANED UP THE WORK AREA AND PUT AWAY THE TOOLS IN THE RIGHT PLACE.

"TURN THE PAGE"

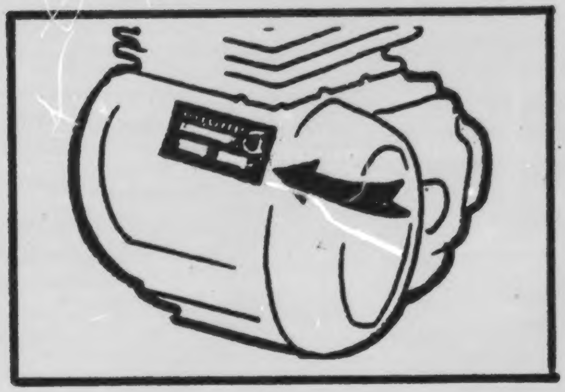
JOB STEPS

READD:

LOOK:

1. TAKE ALL EQUIPMENT AND MATERIALS TO YOUR WORK AREA.

2. A. CHECK THE SERIAL NUMBER AND MODEL ON THE ENGINE AND BE SURE YOU HAVE THE RIGHT SERVICE MANUAL.



B. FIND THE HEAD BOLT TORQUE SPECIFICATIONS AND TIGHTENING PATTERN IN THE MANUAL.

NOTE: THE ENGINE MANUFACTURER SET CERTAIN LIMITS ON TIGHTENING BOLTS AND NUTS. YOU CAN EASILY RUIN AN ENGINE IF YOU DO NOT STAY WITHIN THESE LIMITS. ALSO, THE TIGHTENING PATTERN IS VERY IMPORTANT. THE HEAD MUST BE TIGHTENED DOWN IN THIS WAY SO THAT IT IS MOUNTED EXACTLY FLAT AND DOES NOT WARP.

CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

1. ALL THE TOOLS AND EQUIPMENT FOR THIS MOD.
2. FOUND THE PROPER SPECIFICATIONS FOR THE HEAD BOLTS ON YOUR ENGINE.

"TURN THE PAGE"

WORD GUIDE

INCH POUNDS - A MEASURE OF WORK; 1 POUND BEING MOVED 1 INCH. 120 INCH POUNDS EQUALS 10 FOOT POUNDS.

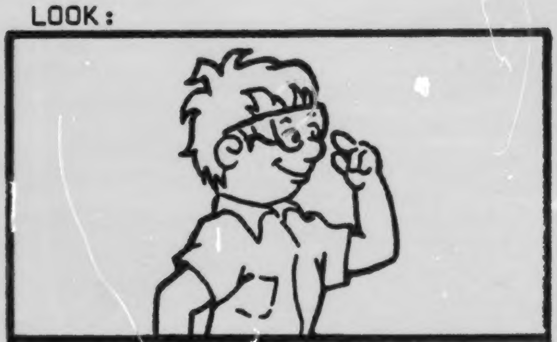
JOB STEPS

READ:

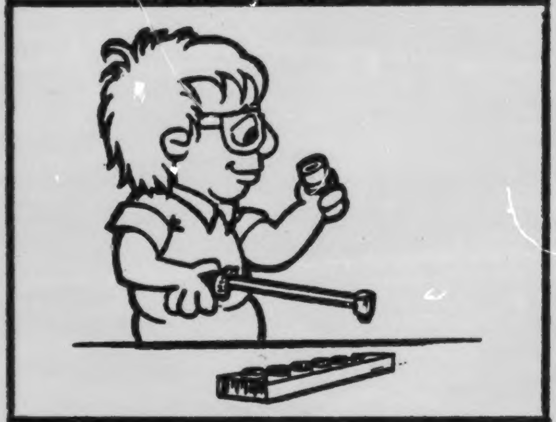
LOOK:

3. TIGHTEN THE CYLINDER HEAD BOLTS TO ABOUT 140 TO 180 INCH POUNDS.

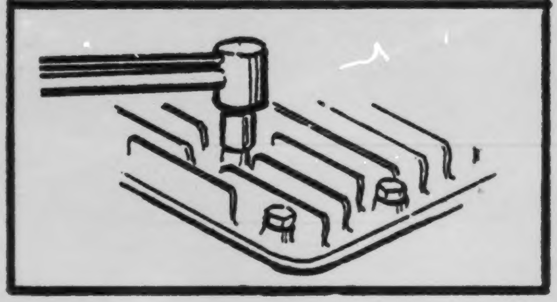
WEAR YOUR SAFETY GLASSES.



4. GET THE RIGHT SOCKET FOR THE HEAD BOLTS AND SNAP IT ONTO THE TORQUE WRENCH.



5. REMOVE ALL THE HEAD BOLTS, IF THEY ARE NOT ALREADY OUT.



"TURN THE PAGE"

WORD GUIDE

ACCURATE - EXACT

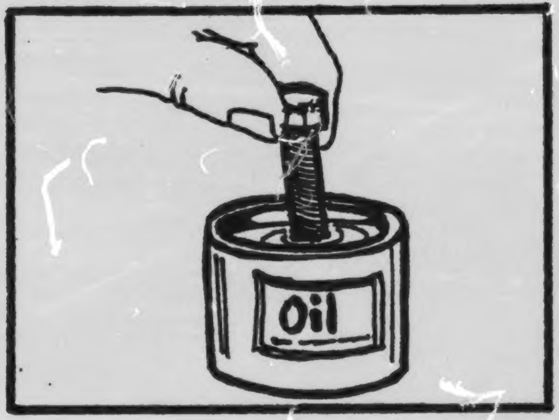
SEQUENCE - ORDER OF DOING SOMETHING.

JOB STEPS

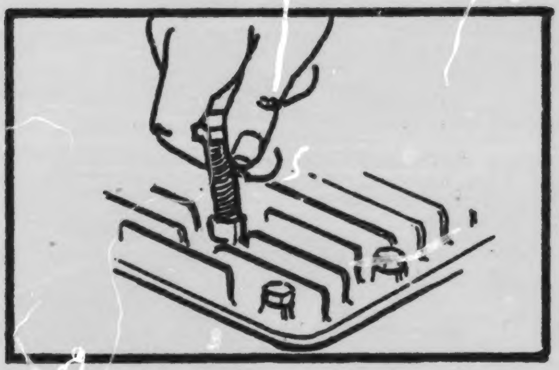
READ:

LOOK:

6. DIP THE THREADS OF THE BOLTS INTO THE LIGHT ENGINE OIL. THIS ALLOWS YOU TO GET AN ACCURATE TORQUE ON THE BOLTS.

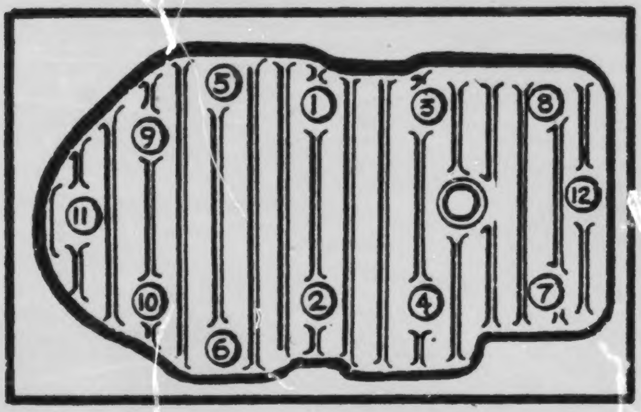


7. HAND TIGHTEN THE BOLTS.



8. USING THE CORRECT TIGHTENING SEQUENCE, TIGHTEN THE BOLTS TO 60 INCH POUNDS.

NOTE: HOLD THE TORQUE WRENCH WITH ONE HAND, CENTERING THE PIVOT HANDLE.



"TURN THE PAGE"

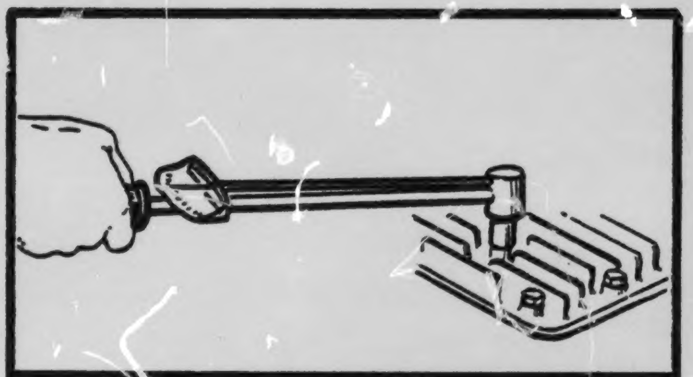
JOB STEPS

READ: LOOK:

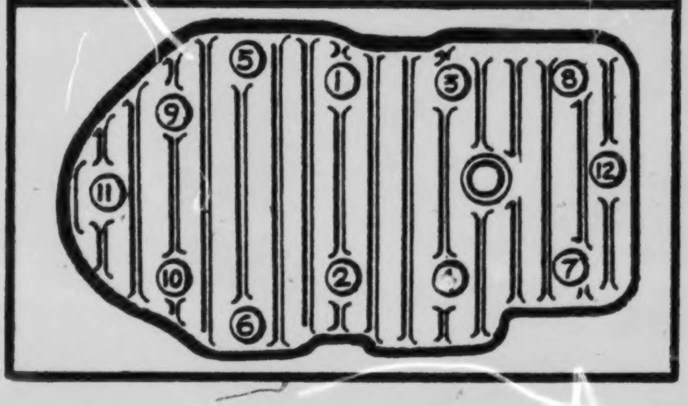
CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

1. DIPPED THE THREADS IN LIGHT OIL.
2. USED THE RIGHT TIGHTENING SEQUENCE ON THE BOLTS.

9. START THE SEQUENCE AGAIN, THIS TIME TIGHTENING TO 100 INCH POUNDS. →



10. START THE SEQUENCE AGAIN, TIGHTENING TO THE MANUFACTURER'S SPECIFICATIONS. →



NOTE: PRACTICE WITH THE TORQUE UNTIL YOU THINK YOU CAN USE IT PROPERLY. THEN, ASK YOUR INSTRUCTOR TO WATCH YOU TORQUE A HEAD BOLT.

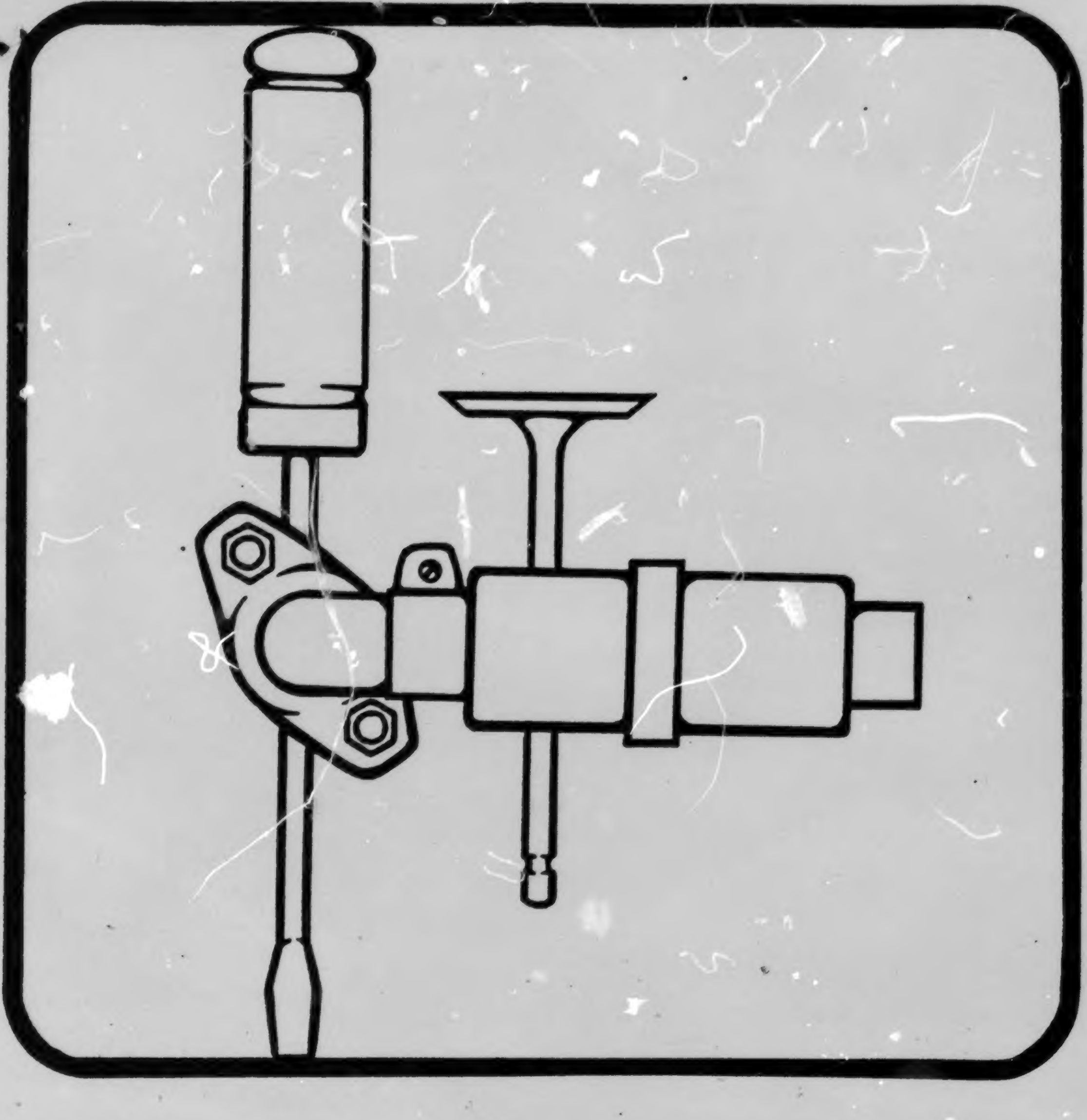
11. IF YOUR INSTRUCTOR SAYS YOU CAN DO IT CORRECTLY, PUT AWAY ALL THE TOOLS AND EQUIPMENT.

12. CLEAN UP THE WORK AREA.

CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

1. FINISHED THE TORQUING.
2. TORQUED A BOLT WITH YOUR INSTRUCTOR WATCHING.
3. CLEANED UP YOUR WORK AREA AND PUT AWAY ALL THE TOOLS.

"TURN THE PAGE"



small engine repair

unit: ENGINE BLOCK MACHINING AND TOOLS

capital area career center

module: 7501 16 006 1
7501 16 006 3
date: DECEMBER 1977
level: I

skill title: HOW TO USE AN IMPACT WRENCH (ELECTRIC)

developed & written by: ALAN STEINBERG

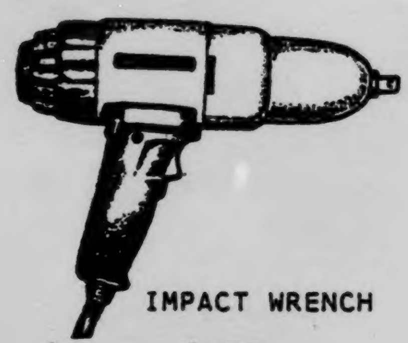
visuals by: SANDRA STARNAMAN

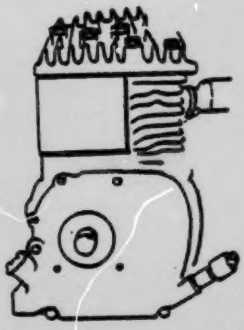
PERFORMANCE OBJECTIVE

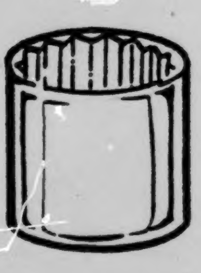
YOU ARE GOING TO LEARN:

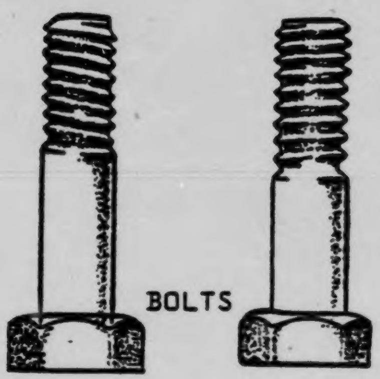
HOW TO USE AN ELECTRIC IMPACT WRENCH SO YOU CAN TAKE OFF BOLTS WITH A RIGHT HAND TWIST OR LEFT HAND TWIST.

AND IN ORDER TO DO THIS YOU WILL NEED:


IMPACT WRENCH


BLOCK WITH HEAD


SOCKET


BOLTS

WE WILL KNOW YOU CAN DO THIS WHEN:

1. YOU HAVE ALL YOUR EQUIPMENT.
2. YOU HAVE USED THE IMPACT WRENCH TO TAKE OFF BOLTS WITH A RIGHT OR LEFT HAND TWIST.

"TURN THE PAGE"

WORD GUIDE

TORQUE -- POWER TO TWIST.

INFORMATION

WE USE THE ELECTRIC IMPACT WRENCH TO TAKE OFF BOLTS BECAUSE IT IS A FAST AND VERY EASY WAY. THIS WRENCH CAN ALSO BE USED TO TIGHTEN BOLTS BACK ON.

THE ELECTRIC IMPACT WRENCH HAS HIGH "TORQUE". YOU CANNOT CHANGE THIS TORQUE SO YOU MUST USE THE WRENCH WITH CARE. BE SURE TO NEVER USE THE WRENCH IN THE WRONG DIRECTION. IF YOU DO, THE TORQUE POWER MAY BREAK THE BOLT.

ON THE DIRECTION CONTROL OF THIS WRENCH, YOU WILL SEE AN "R" AND AN "F". THE "R" MEANS REVERSE AND THE "F" MEANS FORWARD.

REMEMBER: ALL BOLTS MUST BE PUT BACK WITH THE RIGHT AMOUNT OF TORQUE. USE A TORQUE WRENCH WHEN YOU DO THIS.

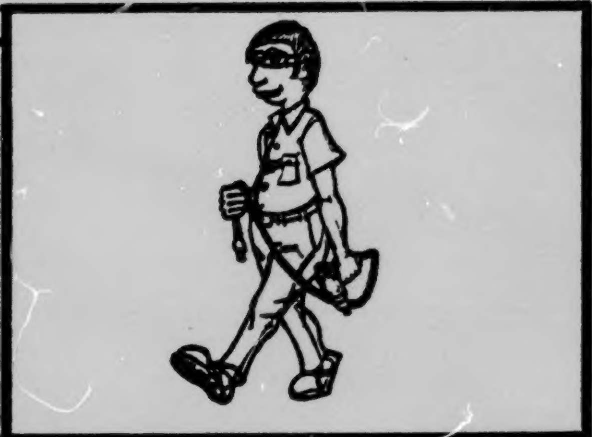
"TURN THE PAGE"

JOB STEPS

READ:

LOOK:

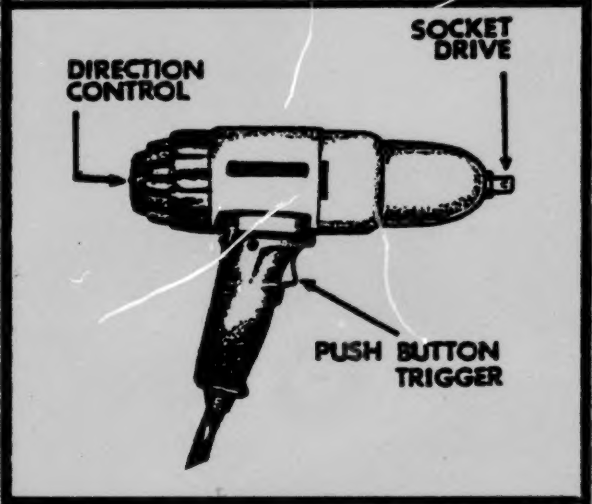
1. GET A WRENCH AND TAKE IT TO YOUR WORK AREA.



CAUTION: DO NOT PLUG IN YOUR WRENCH NOW.

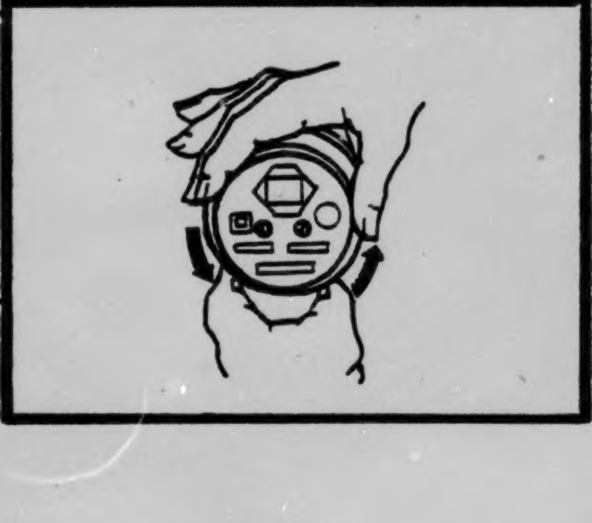
2. LOOK AT YOUR WRENCH. FIND:

   A) THE TRIGGER
   B) THE DIRECTION CONTROL
   C) THE SOCKET DRIVE


SOCKET DRIVE
DIRECTION CONTROL
PUSH BUTTON TRIGGER

3. TO CHANGE THE DIRECTION OF THE SOCKET, TWIST THE CONTROL END OF THE WRENCH. PRACTICE THIS ON YOUR WRENCH.

4. HOLD THE WRENCH TIGHTLY IN YOUR RIGHT HAND. PUT THE CONTROL ON "R" (REVERSE). THE WRENCH CAN NOW BE USED TO TWIST OFF A BOLT.



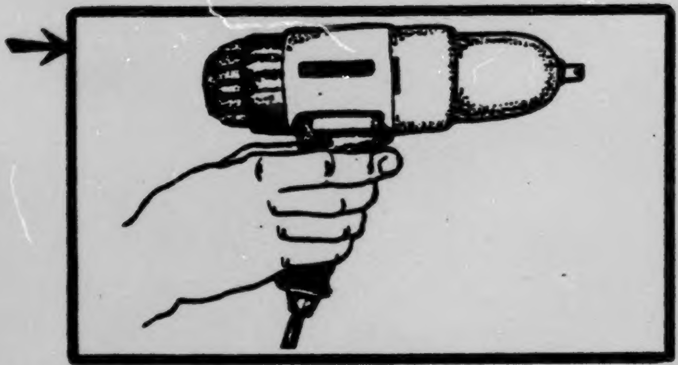
"TURN THE PAGE"

JOB STEPS

READ:

LOOK:

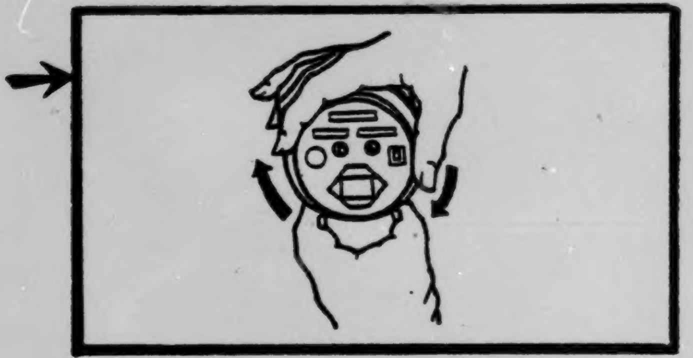
5. PLUG THE WRENCH INTO THE WALL AND PULL THE TRIGGER. WATCH WHICH WAY THE SOCKET TURNS.



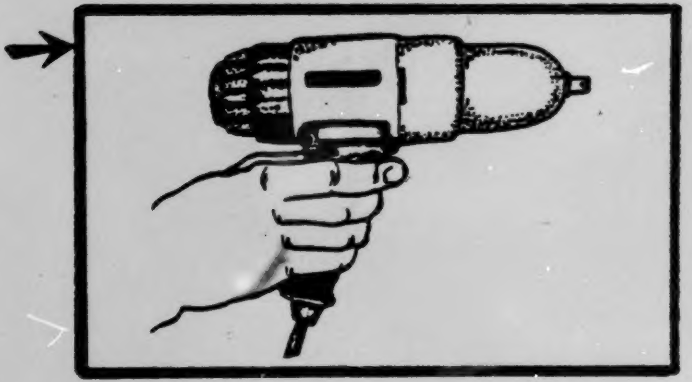
CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU:

1. KNOW THE PARTS ON THE WRENCH.
2. KNOW HOW TO TWIST THE CONTROL END OF WRENCH.
3. KNOW HOW TO PUT THE CONTROL ON "R".
4. PLUGGED THE WRENCH INTO WALL, PULLED THE TRIGGER TO SEE WHICH WAY THE SOCKET TURNS.

6. HOLD THE WRENCH TIGHTLY IN YOUR RIGHT HAND AGAIN. PUT THE CONTROL ON "F" (FORWARD). THE WRENCH CAN NOW BE USED TO SPIN A BOLT BACK ON.



7. PULL THE TRIGGER AND WATCH WHICH WAY THE SOCKET TURNS.



CAUTION: ALWAYS HOLD THE WRENCH TIGHTLY!

"TURN THE PAGE"

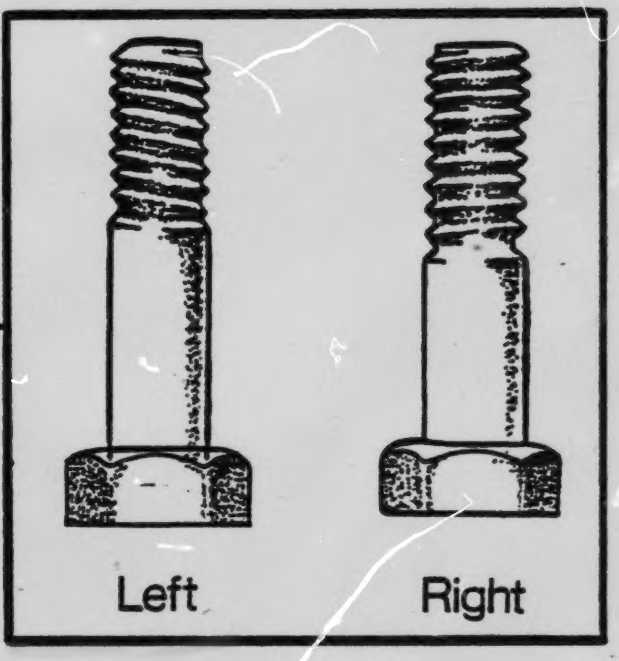
JOB STEPS

READ: LOOK:

8. DO STEPS 4-7 OVER AGAIN TO BE SURE YOU KNOW HOW TO CONTROL THE SOCKET IN THE RIGHT WAY.

CAUTION: YOU MUST ALWAYS KNOW WHICH WAY YOU WANT TO TURN THE BOLT (OR NUT) BEFORE YOU USE THE WRENCH. DO NOT USE THE WRENCH UNTIL YOU DO KNOW.

9. LOOK AT THIS PICTURE AND TRY TO FIGURE OUT WHICH WAY YOU'D HAVE TO TURN THESE BOLTS TO MAKE THEM LOOSE AND THEN WHICH WAY TO MAKE THEM TIGHT.



NOTE: SOME BOLTS HAVE AN "L" ON THE BOLT HEAD. THIS MEANS THEY HAVE LEFT HAND THREADS, SO YOU WOULD USE "F" POSITION TO TAKE THEM OFF.

CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

1. PUT CONTROL ON "F" AND WATCHED WHICH WAY SOCKET TURNS.
2. DONE STEPS 4-7 AGAIN.
3. LOOKED AT PICTURE AND FIGURED OUT WHICH WAY TO TURN THE BOLTS TO MAKE THEM LOOSE OR TIGHT.

"TURN THE PAGE"

WORD GUIDE

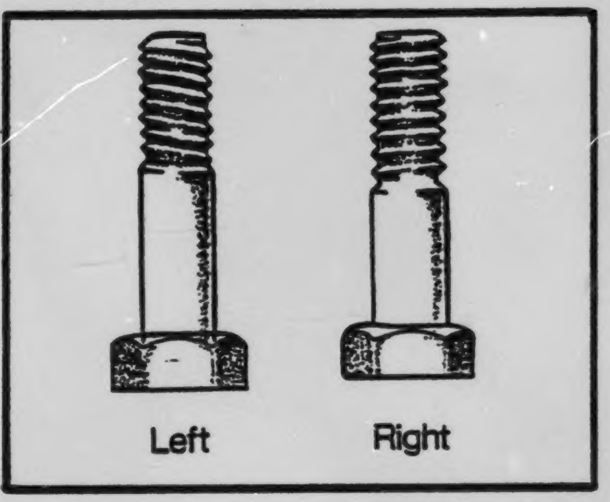
SLANT - ANGLE, LEAN OR POINT.

JOB STEPS

READ:

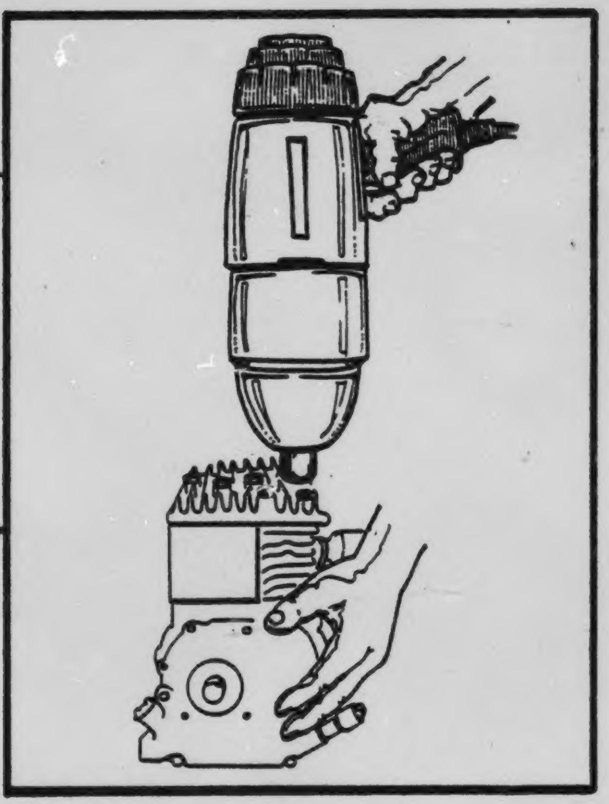
LOOK:

10. STUDY THIS PICTURE UNTIL YOU LEARN WHICH WAY THE THREADS SLANT ON EACH BOLT. ON SOME BOLTS, THE THREADS SLANT TO THE LEFT SO THESE BOLTS HAVE A LEFT HAND TWIST. ON SOME, THE THREADS SLANT TO THE RIGHT, SO THEY HAVE A RIGHT HAND TWIST.



> REMEMBER: ALWAYS KNOW WHICH WAY IS THE RIGHT WAY TO TURN THE BOLT (OR NUT). YOU CAN BREAK THE BOLT (OR NUT) IF YOU DO NOT KNOW THIS FIRST.

11. PUT THE WRENCH ON THE BOLT YOU WANT TO MAKE LOOSE.



12. PULL THE TRIGGER. WHEN THE BOLT IS LOOSE, LET GO.

"TURN THE PAGE"

WORD GUIDE

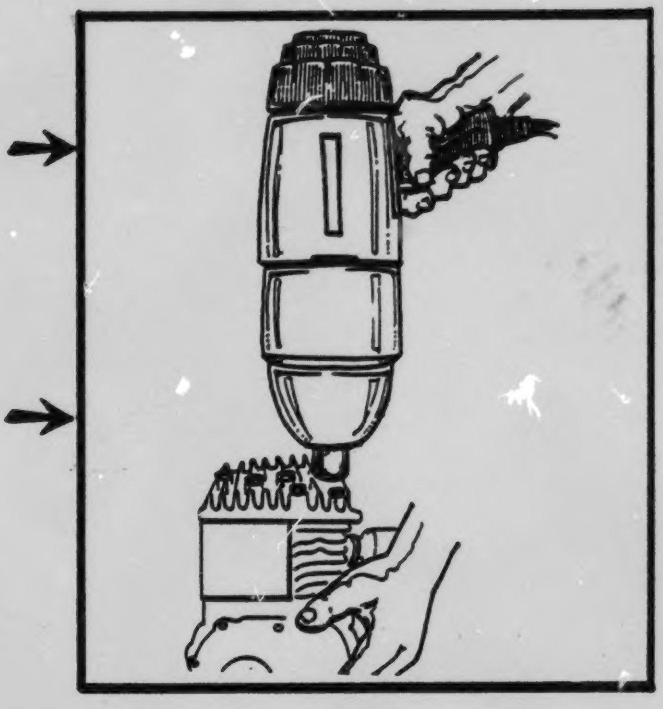
HAMMER - POUND UP AND DOWN.

JOB STEPS

READ: LOOK:

13. IF THE BOLT DOES NOT COME LOOSE, MAKE SURE YOU ARE TURNING IT THE RIGHT WAY BY TURNING IT THE OTHER WAY UNTIL YOU FEEL THE WRENCH HAMMER A FEW TIMES.

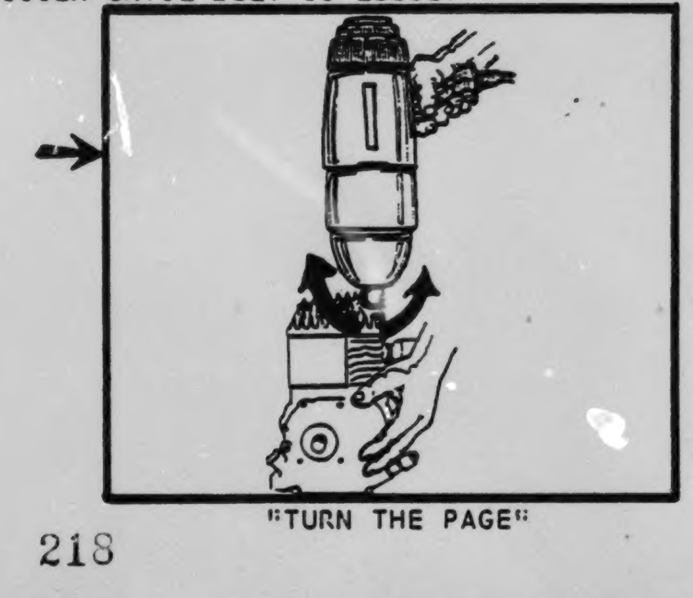
14. THEN, TRY IT AGAIN THE RIGHT WAY. THIS MAY GET THE BOLT LOOSE.



CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

1. STUDIED THE PICTURE TO LEARN WHICH BOLT THREADS HAVE LEFT OR RIGHT HAND TWISTS.
2. PUT THE WRENCH ON BOLT.
3. PULLED THE TRIGGER UNTIL BOLT IS LOOSE.

15. TURN THE HEAD BOLTS ON AN ENGINE TO MAKE THEM LOOSE. BE SURE YOU ARE TURNING THE BOLTS THE RIGHT WAY.



"TURN THE PAGE"

WORD GUIDE

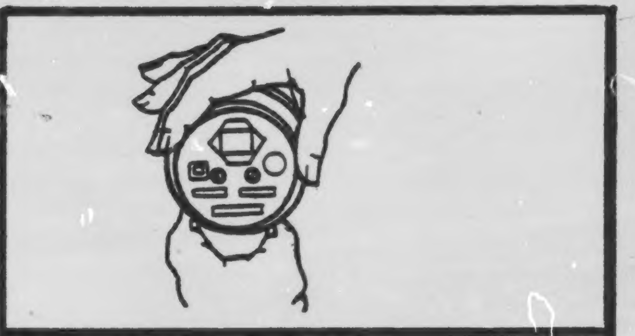
TORQUE - TWIST (POWER).

JOB STEPS

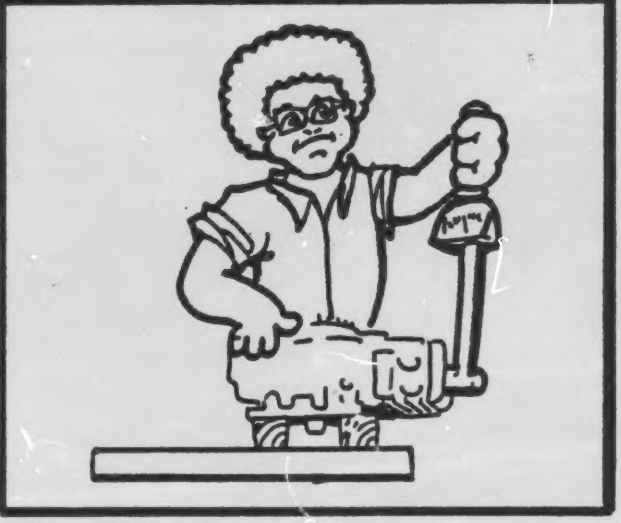
READ:

LOOK:

16. NOW MAKE THE BOLTS TIGHT AGAIN. REMEMBER TO TURN THE WRENCH THE OTHER WAY.



17. USE THE TORQUE WRENCH TO TORQUE THE BOLTS.

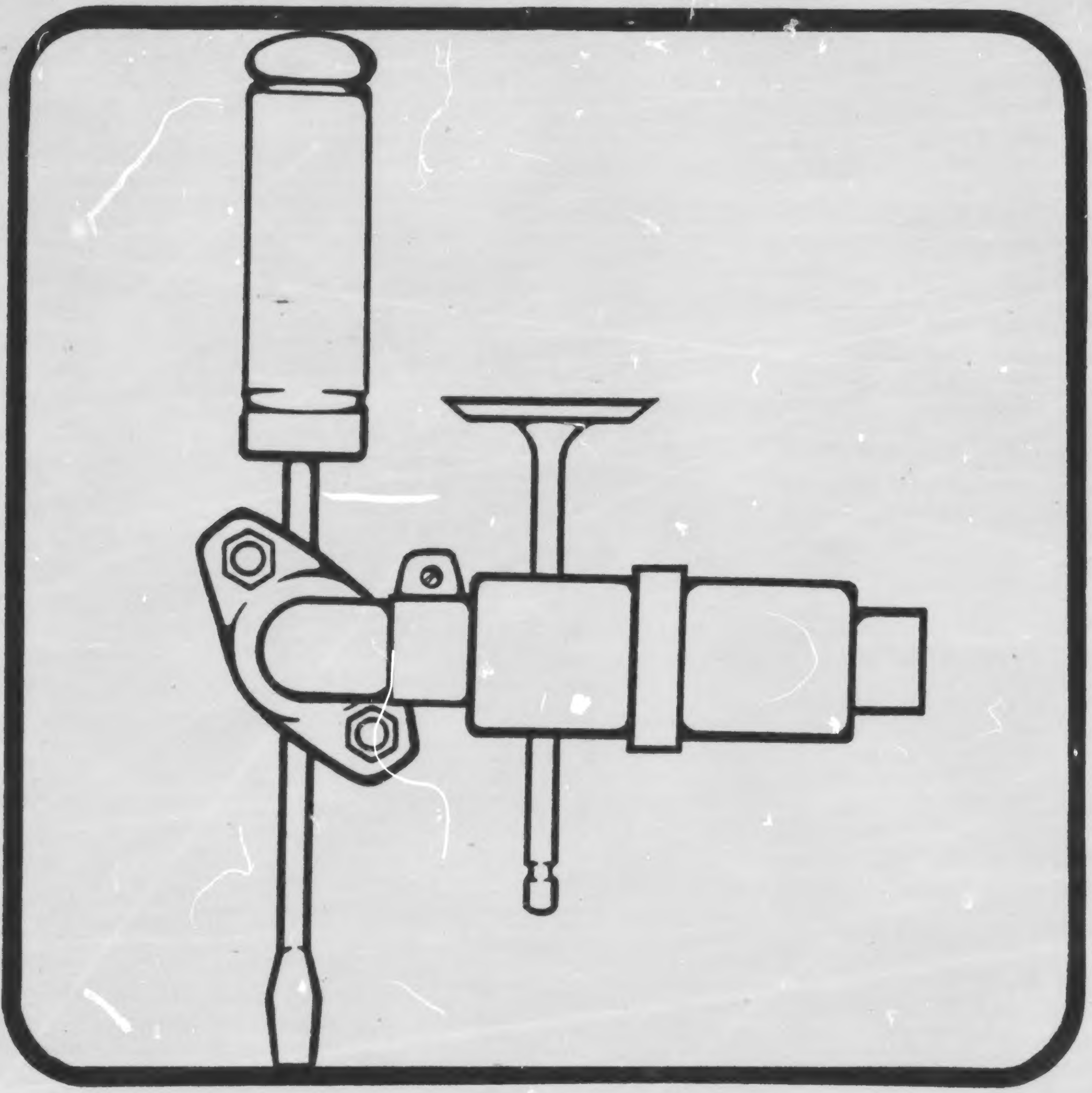


18. PRACTICE USING THE ELECTRIC IMPACT WRENCH BY DOING JOB STEPS 15-17 AGAIN.

CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

1. MADE THE HEAD BOLTS LOOSE.
2. MADE THE HEAD BOLTS TIGHT AGAIN.
3. TORQUED THE BOLTS.

19. NOW PUT AWAY ALL TOOLS.



small engine repair

unit: ENGINE BLOCK MACHINING

capital area career center

module: 7501 16 007 1
7501 16 007 3 **date:** APRIL 1977 **level:** I

skill title: HOW TO USE AN AIR IMPACT WRENCH

developed & written by: DANIEL M. WOODWARD

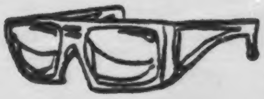
visuals by: DAVE WEHRWEIN

PERFORMANCE OBJECTIVE

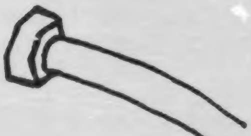
YOU ARE GOING TO LEARN:

HOW TO USE AN AIR-POWERED IMPACT WRENCH.

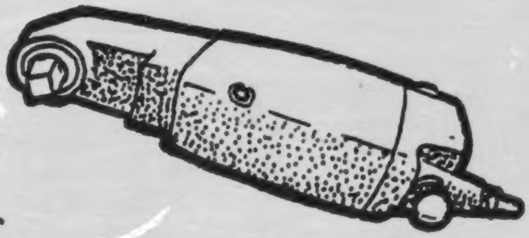
AND IN ORDER TO DO THIS YOU WILL NEED:



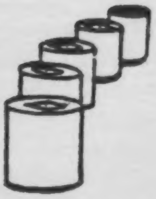
SAFETY GLASSES



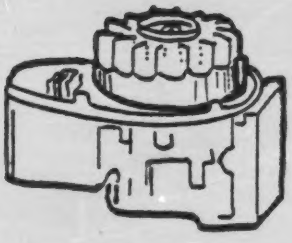
AN AIR SUPPLY HOSE



AN AIR IMPACT WRENCH



SOCKETS FOR THE IMPACT WRENCH



AN ENGINE BLOCK WITH A HEAD IN PLACE

WE WILL KNOW YOU CAN DO IT WHEN:

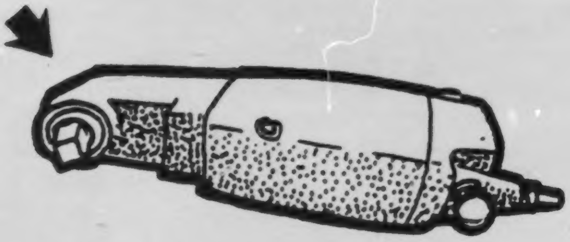
1. YOU HAVE GATHERED ALL YOUR EQUIPMENT.
2. YOU HAVE READ THE JOB STEPS.
3. YOU HAVE TIGHTENED AND LOOSENED THE HEAD·BOLTS AT DIFFERENT SETTINGS ON THE IMPACT WRENCH.

"TURN THE PAGE"

INFORMATION

MOST SMALL ENGINES HAVE A COVER OVER THE PISTONS CALLED A HEAD. THE BOLTS THAT HOLD THE HEAD ON THE ENGINE BLOCK ARE SCREWED DOWN VERY TIGHTLY. YOU ARE GOING TO NEED A SPECIAL KIND OF TOOL TO LOOSEN THE BOLTS. IT'S CALLED AN AIR IMPACT WRENCH.

WITH AN AIR IMPACT WRENCH YOU CAN ADJUST THE AMOUNT OF POWER OR IMPACT IT TAKES TO LOOSEN A BOLT. IT ALSO HAS A RIGHT ANGLE (90°) HEAD SO IT CAN GET INTO TIGHT PLACES. IT LOOKS LIKE THE PICTURE BELOW.



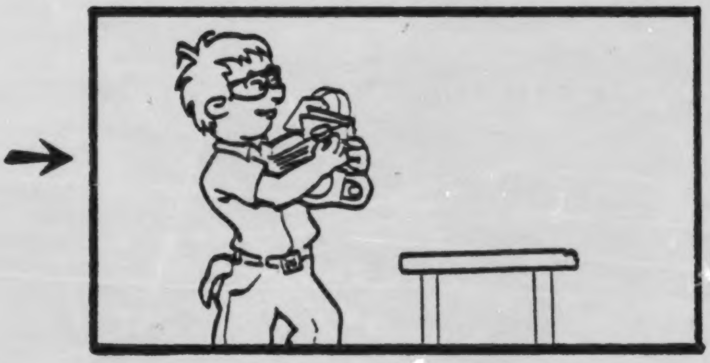
THE IMPACT WRENCH WILL HAVE SOCKETS THAT GO WITH IT. DO NOT USE SOCKETS THAT ARE TOO BIG, WORN SMOOTH INSIDE THE SOCKET, OR CRACKED. THESE SOCKETS WOULD NOT BE ABLE TO GET A TIGHT HOLD OF THE BOLT, THEY COULD DAMAGE THE BOLT.

SOME IMPACT WRENCHES ARE STRONGER THAN OTHERS. SO IT'S IMPORTANT THAT YOU USE A LARGE ENOUGH WRENCH. IF THE IMPACT WRENCH DOES NOT LOOSEN A BOLT OR A NUT IN 3 TO 5 SECONDS, GET A LARGER WRENCH.

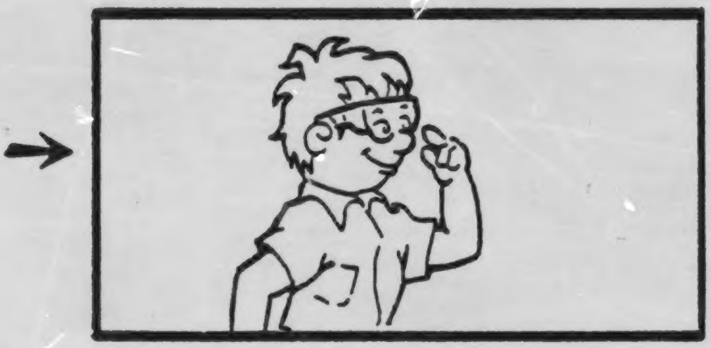
JOB STEPS

READ: LOOK:

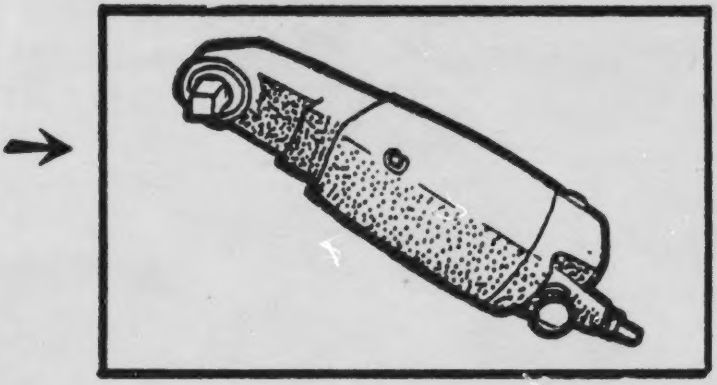
1. GET ALL YOUR EQUIPMENT AND TAKE IT TO YOUR WORK AREA.



2. PUT ON YOUR SAFETY GLASSES.



3. TAKE THE AIR IMPACT WRENCH AND PUT THE RIGHT ANGLE DRIVE HEAD ON IT. IT LOOKS LIKE THE PICTURE ON PAGE 3.

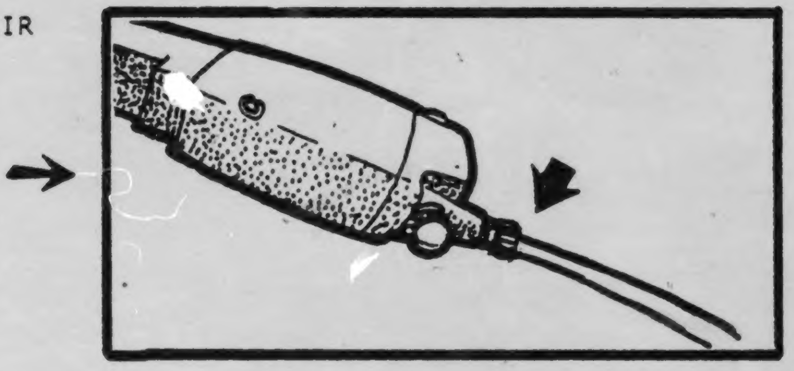


"TURN THE PAGE"

JOB STEPS

READ: LOOK:

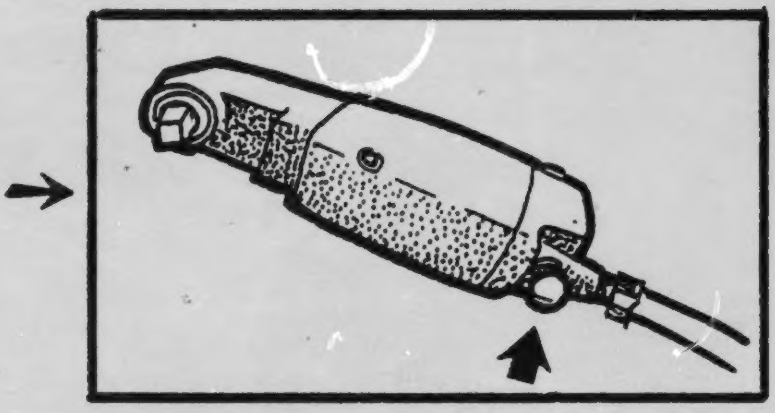
4. HOOK THE WRENCH TO THE AIR SUPPLY LINE.



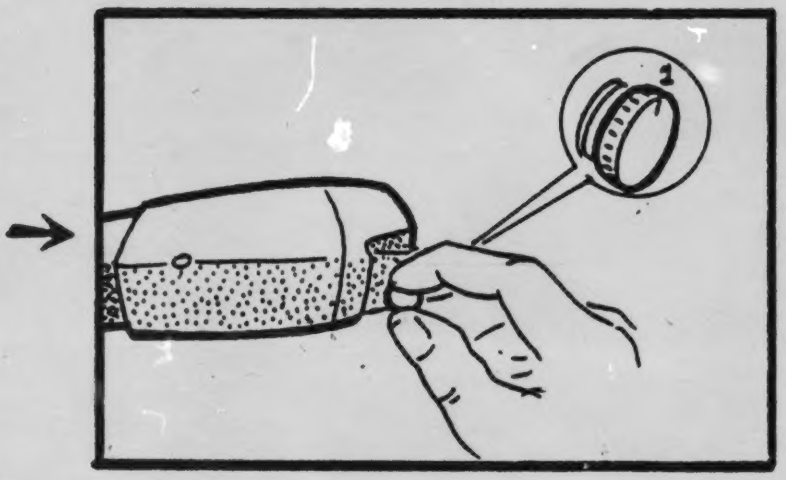
CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

1. ALL YOUR EQUIPMENT.
2. THE RIGHT ANGLE DRIVE HEAD ON THE WRENCH.
3. HOOKED THE WRENCH TO THE AIR SUPPLY LINE.

5. ON THE WRENCH, FIND THE AIR PRESSURE CONTROL VALVE.



6. TURN THE KNOB TO "1".



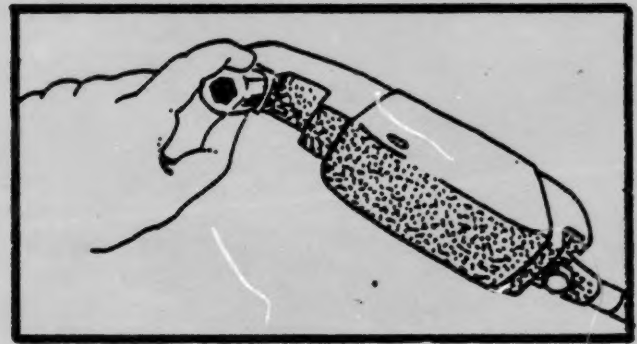
"TURN THE PAGE"

JOB STEPS

READ: LOOK:

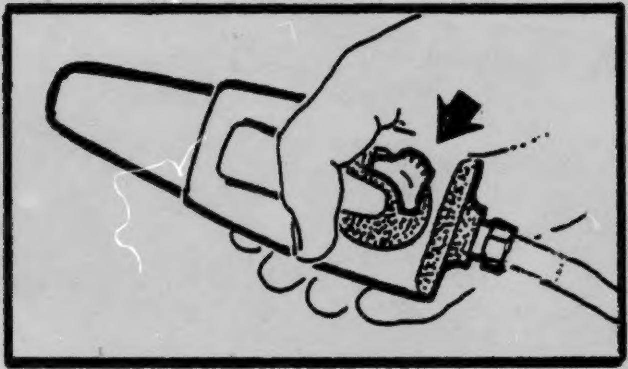
7. PLACE THE CORRECT SOCKET ON THE WRENCH.

→



8. PUSH THE REVERSE-FORWARD LEVER TO "R", AND THEN BACK OFF.

→

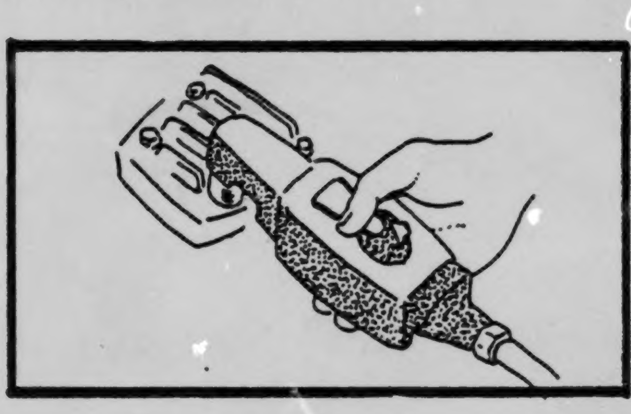


CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU:

1. KNOW THE AIR PRESSURE CONTROL KNOB.
2. KNOW HOW TO TURN THE KNOB TO "1".
3. HAVE PUT THE CORRECT SOCKET ON THE WRENCH.
4. CAN PUSH THE REVERSE-FORWARD LEVER TO "R".

9. PUT THE WRENCH AND SOCKET ON THE HEAD BOLT.

→

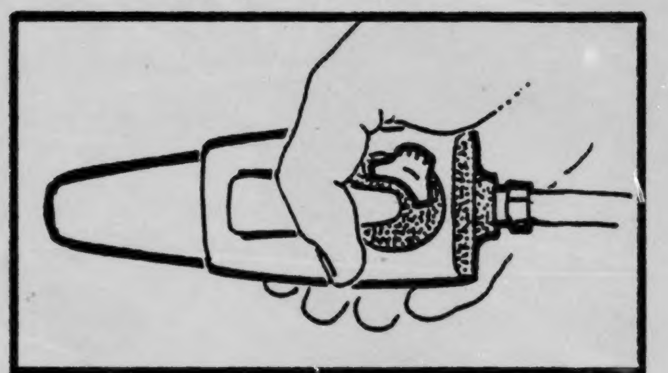


"TURN THE PAGE"

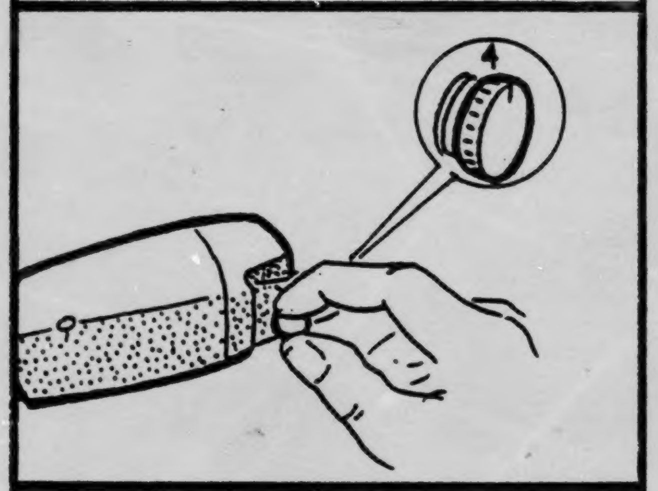
JOB STEPS

READ: LOOK:

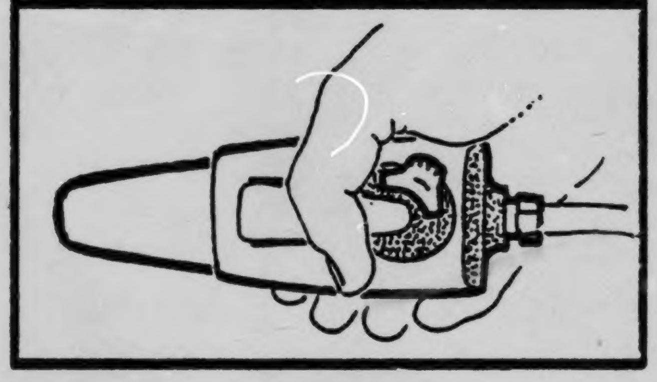
10. PUSH THE TRIGGER DOWN AND LOOSEN THE BOLT.



11. TURN THE AIR PRESSURE CONTROL KNOB TO "4".



12. PUSH THE TRIGGER DOWN AND LOOSEN THE NEXT HEAD BOLT.



CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

1. PUT THE WRENCH AND SOCKET ON THE HEAD BOLT CORRECTLY.
2. LOOSENED TWO HEAD BOLTS.

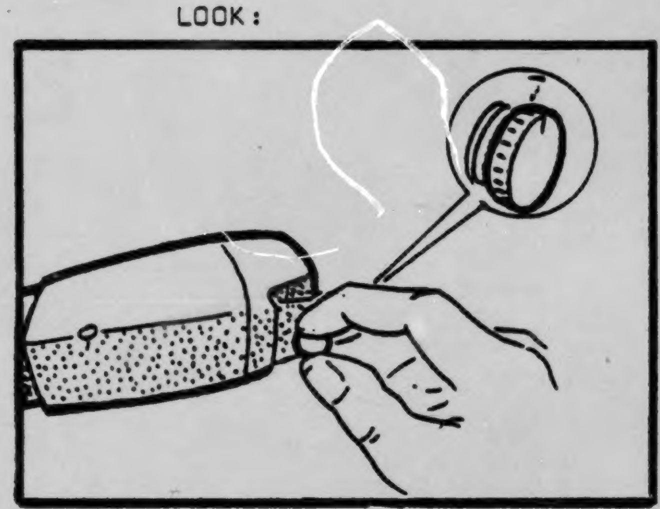
"TURN THE PAGE"

JOB STEPS

READ:

LOOK:

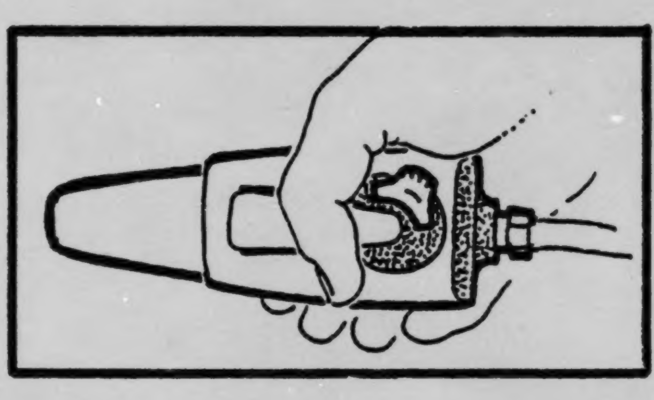
13. TURN THE AIR PRESSURE CONTROL KNOB TO "7". →



14. LOOSEN THE THIRD HEAD BOLT.

NOTE: AS YOU TURN THE AIR PRESSURE CONTROL KNOB TO HIGHER NUMBERS, MORE PRESSURE IS PUT ON THE HEAD BOLT TO LOOSEN IT. THUS, THE HIGHER THE NUMBER, THE MORE PRESSURE.

15. TRY OTHER SETTINGS ON THE CONTROL KNOB AND LOOSEN THE LAST HEAD BOLTS. →



CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

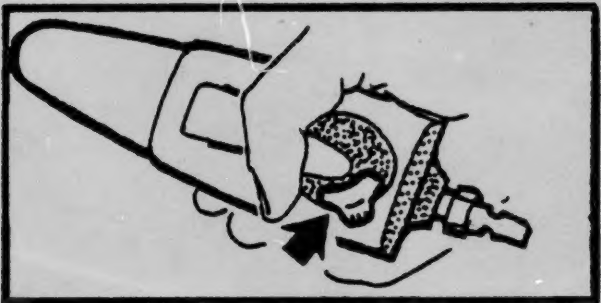
1. LOOSENED ALL OF THE HEAD BOLTS.
2. NOT DAMAGED ANY OF THE HEADS OF THE BOLTS BY USING SOCKETS THAT DON'T FIT RIGHT.

"TURN THE PAGE"

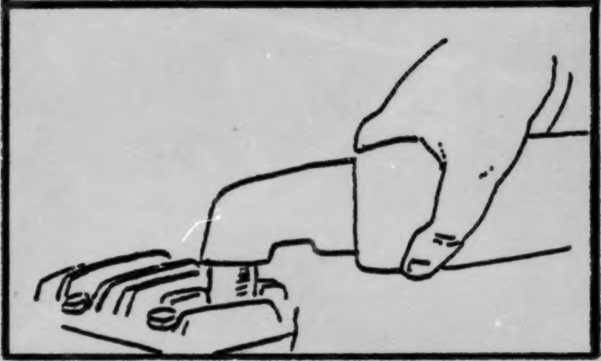
JOB STEPS

READ: LOOK:

16. NOW CHANGE THE FORWARD-REVERSE LEVER TO THE "F" POSITION. →

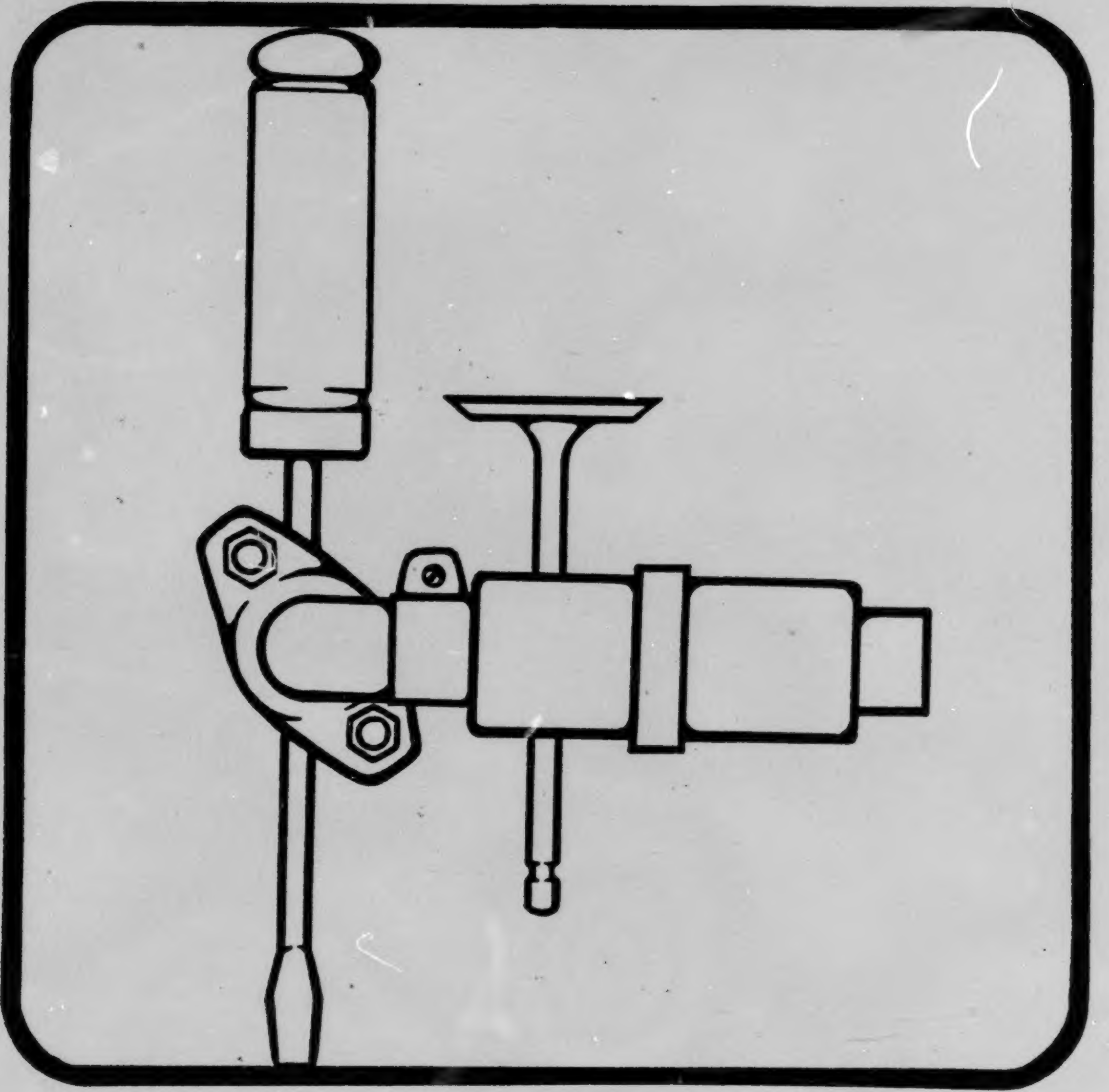


17. PUT THE WRENCH AND SOCKET ON THE HEAD BOLTS AND TIGHTEN THEM. →



CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE TIGHTENED ALL HEAD BOLTS.

18. IF YOUR WORK WAS OK, RETURN ALL OF YOUR EQUIPMENT TO THE RIGHT PLACE.



small engine repair

unit: ENGINE BLOCK MACHINING AND TOOLS

capital area career center

module: 7501 16 008 1
7501 16 008 3 **date:** DECEMBER 1977 **level:** I

skill title: HOW TO USE AN AIR RATCHET WRENCH

developed & written by: ALAN STEINBERG

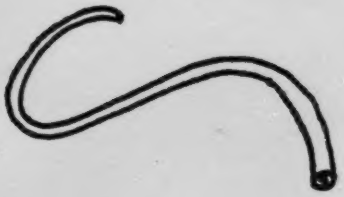
visuals by: SANDRA STARNAMAN

PERFORMANCE OBJECTIVE

YOU ARE GOING TO LEARN:

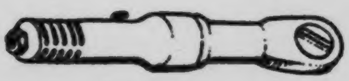
HOW TO USE AN AIR RATCHET WRENCH.

AND IN ORDER TO DO THIS YOU WILL NEED:

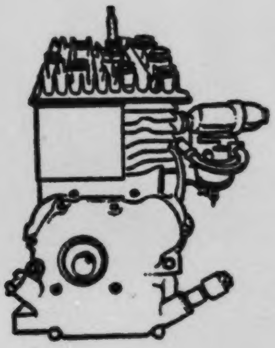


AIR HOSE

SAFETY GLASSES



AIR RATCHET WRENCH/SOCKETS



AN ENGINE OR BLOCK WITH HEAD

WE WILL KNOW YOU CAN DO IT WHEN:

YOU HAVE ALL YOUR EQUIPMENT.

YOU HAVE USED THE WRENCH IN THE RIGHT WAY TO BREAK THE BOLTS LOOSE.

YOU HAVE MADE THE BOLTS TIGHT AND THEN LOOSE BY MOVING THE WRENCH THE RIGHT WAY FOR EACH.

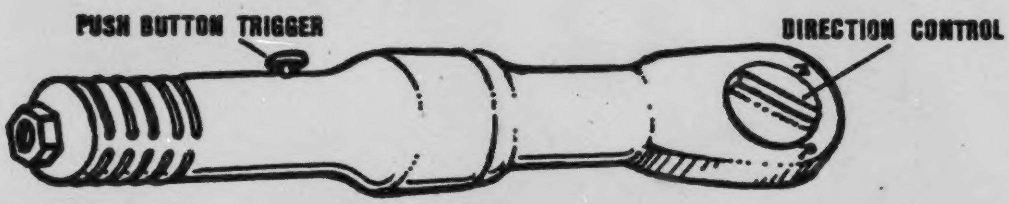
TURN THE PAGE

INFORMATION

THE AIR RATCHET WRENCH IS NOT LIKE THE IMPACT TYPE WRENCH BECAUSE IT HAS VERY LITTLE TWISTING POWER.

YOU USE THE AIR RATCHET WRENCH JUST LIKE YOU USE A REGULAR RATCHET WRENCH;

YOU WILL SEE AN "R" AND AN "F" ON THE WRENCH AT THE DIRECTION CONTROL. "R" MEANS REVERSE AND "F" MEANS FORWARD. "R" IS USED TO TAKE OFF MOST BOLTS. "F" IS USED TO MAKE MOST BOLTS TIGHT.



NOTE: IF YOUR BOLT HAS AN "L" ON IT, IT IS A LEFT HAND THREAD. THIS MEANS YOU WILL USE "R" SETTING TO PUT BOLT ON, AND "F" TO LOOSEN IT.

THE "R" SETTING IS USED TO:

A. MAKE BOLTS TIGHT.

B. TAKE OFF MOST BOLTS.

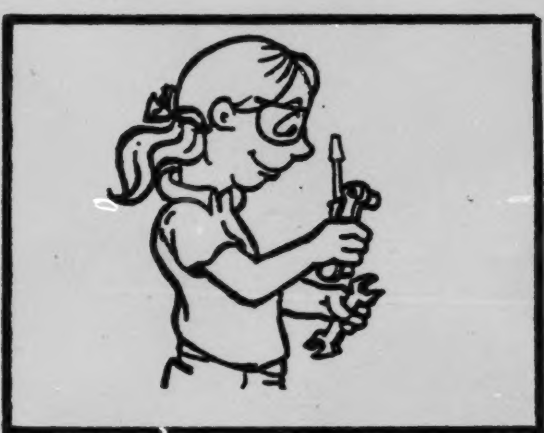
IF YOU DID NOT ANSWER "B", RE-READ THE ABOVE PARAGRAPH.

TURN THE PAGE

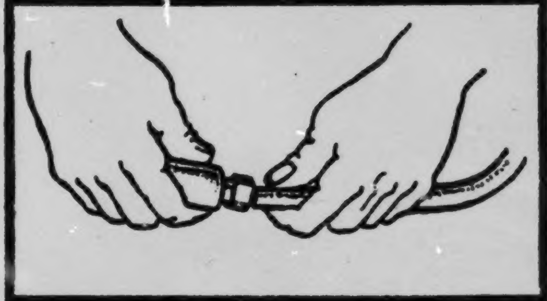
JOB STEPS

READ: LOOK:

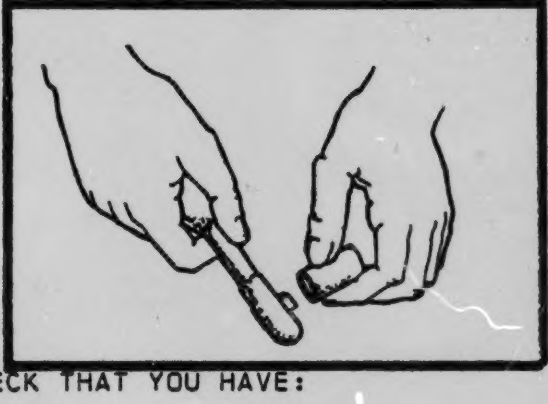
1. GET ALL EQUIPMENT AND TAKE IT TO YOUR WORK AREA.



2. PLUG THE AIR RATCHET WRENCH INTO THE AIR HOSE. WEAR YOUR SAFETY GLASSES.



3. LOOK AT THE BOLTS ON THE ENGINE. THEN, GET THE RIGHT SIZE SOCKET AND PUT IT ON THE WRENCH.



CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

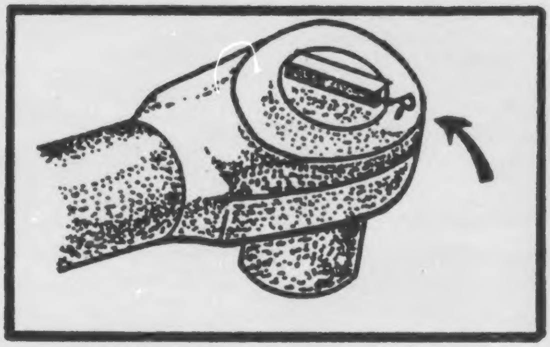
1. ALL EQUIPMENT.
2. PLUGGED AIR RATCHET WRENCH INTO AIR HOSE.
3. PUT THE RIGHT SIZE SOCKET ON THE WRENCH.

TURN THE PAGE

JOB STEPS

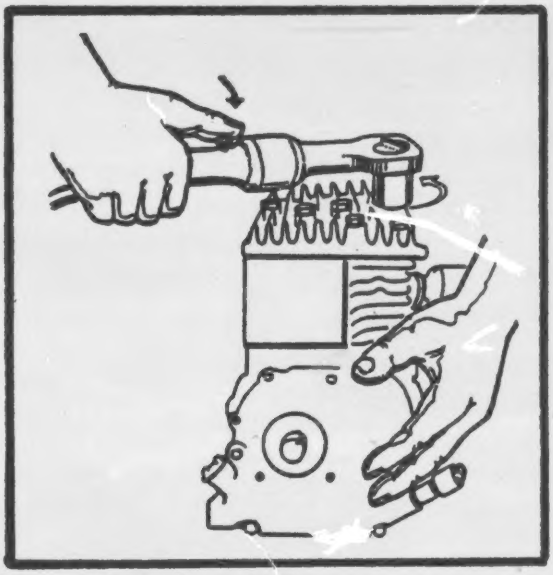
READ: LOOK:

4. HOLD THE ENGINE BLOCK TIGHTLY. BE SURE THE DIRECTION CONTROL IS SET ON THE "R" (REVERSE).



5. PUT THE WRENCH ON THE BOLT.

6. HOLD THE HANDLE OF THE WRENCH TIGHTLY, AND PUSH THE START BUTTON ON THE HANDLE. THIS SHOULD BREAK THE BOLT LOOSE. LET GO OF BUTTON.



REMEMBER: HOLD HANDLE TIGHTLY.

CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

1. MADE SURE THE DIRECTION CONTROL IS SET ON "R".
2. PUSHED THE START BUTTON ON HANDLE TO BREAK LOOSE THE BOLT.

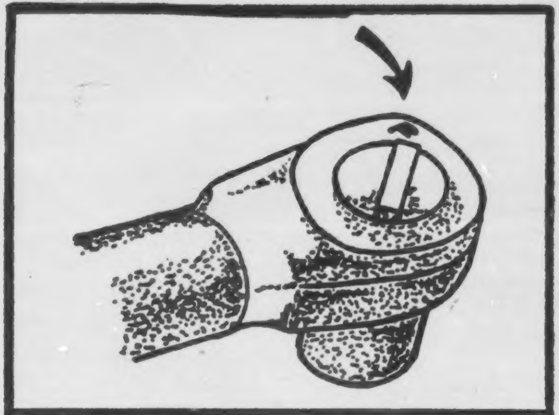
TURN THE PAGE

JOB STEPS

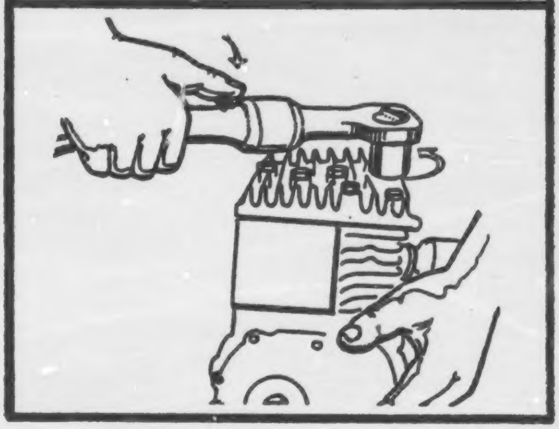
READ:

LOOK:

7. THEN SET THE CONTROL ON "F" (FORWARD).



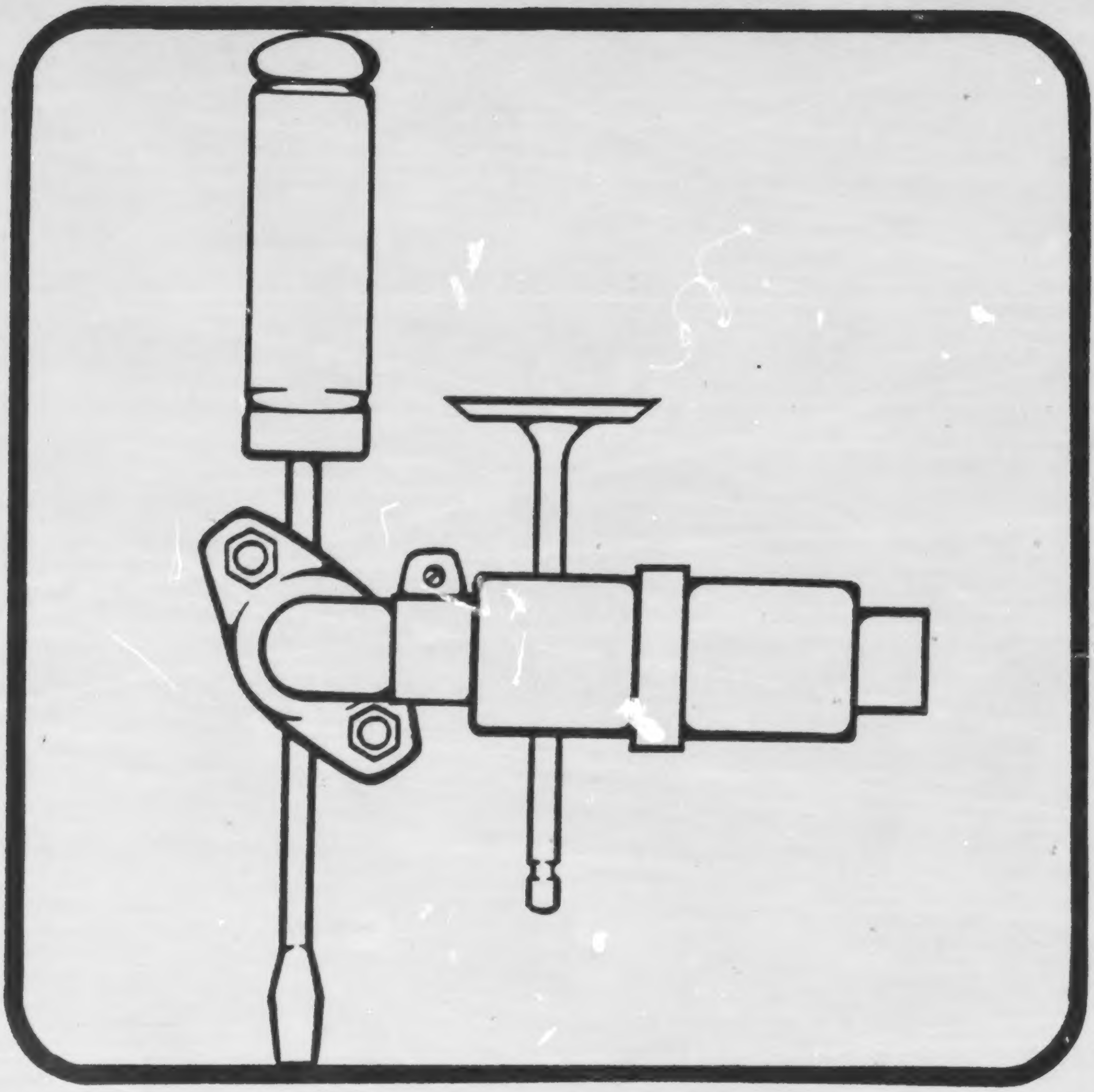
8. PUSH THE START BUTTON AND SPIN THE BOLT BACK IN.



9. PRACTICE USING THE AIR RATCHET WRENCH BY DOING JOB STEPS 1-8 OVER AGAIN.

10. SHOW YOUR INSTRUCTOR HOW YOU USE THIS WRENCH.

CHECK: ASK YOUR INSTRUCTOR TO WATCH YOU USE THE AIR RATCHET WRENCH, THEN CLEAN UP YOUR AREA.



small engine repair

unit: TUNE-UP

capital area career center

module: 7501 18 001 1
7501 18 001 3 date: SEPTEMBER 1977 level: IV

skill title: MINOR TUNE-UP ON AIR COOLED ENGINE (2 OR 4 CYCLE)

developed & written by: DWIGHT SMITH

visuals by: DAVE WEHRWEIN

WORD GUIDE

IDLE - WHEN ENGINE RUNS WHILE CAR OR MACHINE IS NOT MOVING

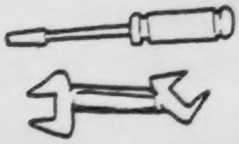
RPM - REVOLUTIONS OR TURNS PER MINUTE

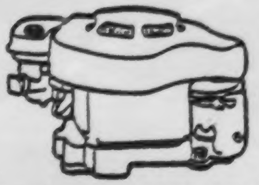
PERFORMANCE OBJECTIVE

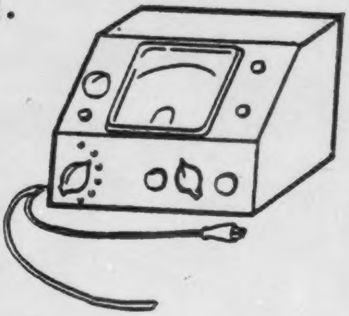
YOU ARE GOING TO LEARN:

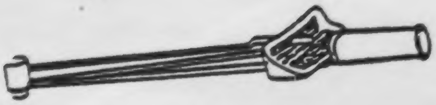
HOW TO TUNE UP A 2 OR 4 -CYCLE, AIR-COOLED ENGINE.

AND IN ORDER TO DO THIS YOU WILL NEED:


HAND TOOLS


2 OR 4-CYCLE AIR-COOLED ENGINE


MERCOTRONIC TESTER


TORQUE WRENCH

REPLACEMENT PARTS

MANV.
MANUAL
SERVICE MANUAL FOR ENGINE

WE WILL KNOW YOU CAN DO IT WHEN:

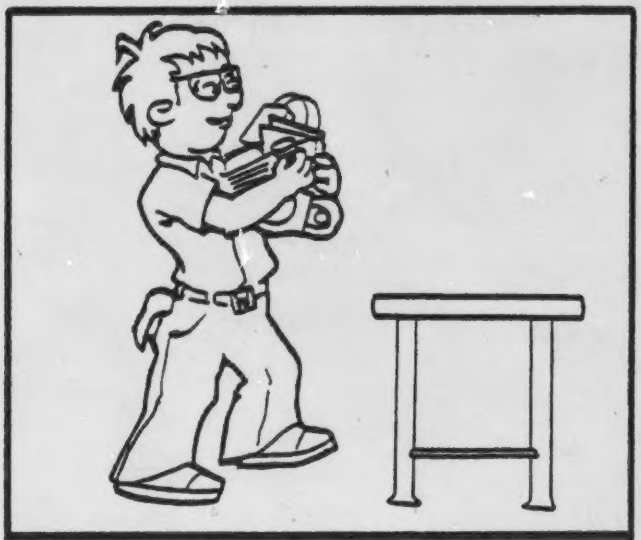
1. YOU CAN START THE TUNED-UP ENGINE WITH 3 PULLS OR LESS.
2. THE ENGINE RUNS SMOOTHLY AND IDLES AT THE RIGHT RPM.
3. YOU HAVE CLEANED UP THE WORK AREA AND PUT BACK THE TOOLS.

"TURN THE PAGE"

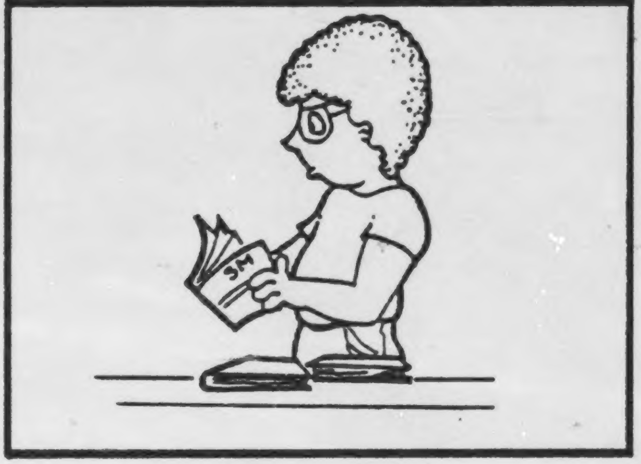
JOB STEPS

READ: LOOK:

1. TAKE ALL EQUIPMENT TO YOUR WORK AREA.



2. LOOK CAREFULLY AT THE MOWER YOU WILL TUNE-UP. FIND THE SERIAL NUMBER AND THE MODEL. BE SURE YOU HAVE THE RIGHT SERVICE MANUAL FOR THE ENGINE.



NOTE: A COMPLETE TUNE-UP INCLUDES:

A. CLEANING THE CARBURETOR
B. CLEANING THE CARBON FROM THE HEAD, VALVES AND PISTON
C. CHANGING THE OIL
D. CHECKING THE MAGNETO (AND TIMING IT, IF NEEDED)
E. CHECKING THE VALVES AND SEATS
F. CLEANING THE AIR FILTER
G. CHANGING THE POINTS, PLUG AND CONDENSER
H. TORQUING THE HEAD BOLTS
I. ADJUSTING THE THROTTLE
J. ADJUSTING THE GOVERNOR
K. CLEANING THE MOWER

CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

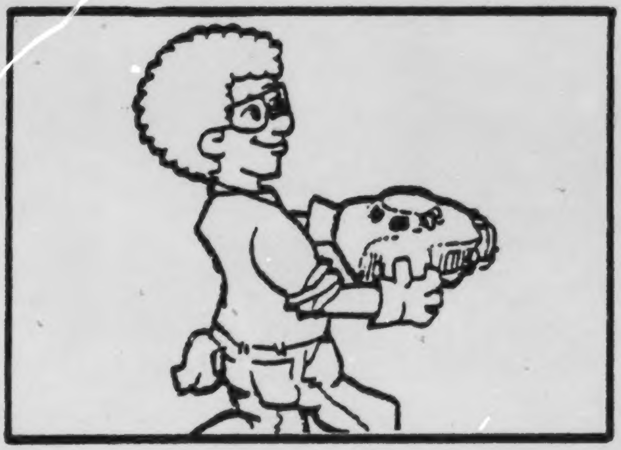
1. ALL THE EQUIPMENT FOR THIS MOD.
2. THE RIGHT SERVICE MANUAL FOR THE ENGINE YOU WILL TUNE-UP.
3. LEARNED WHAT A FULL TUNE-UP DOES.

"TURN THE PAGE"

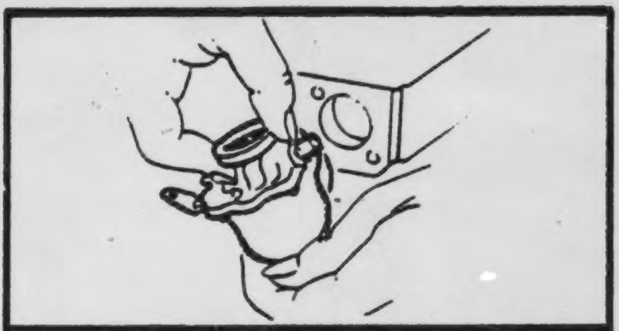
JOB STEPS

READ: LOOK:

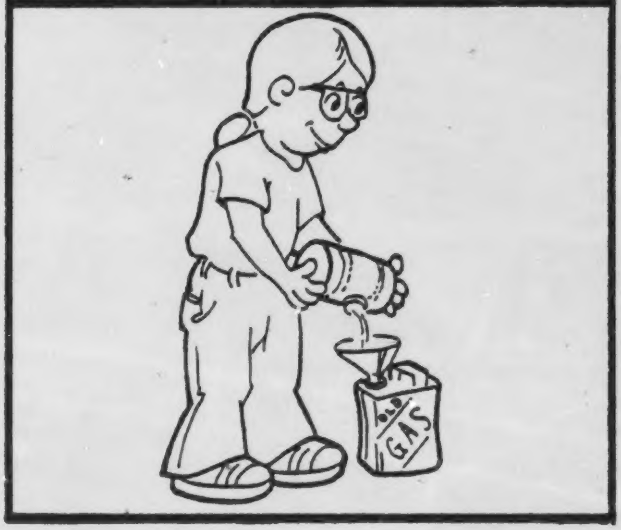
3. REMOVE THE ENGINE FROM THE
MOUNTS, LIKE YOU DID IN MODULES:
7501 15 005 1 7501 15 003 1 →
7501 14 005 3 7501 15 003 3
AND
7501 15 002 1
7501 15 002 3



4. TAKE OFF THE CARBURETOR AND
FUEL TANK, LIKE YOU DID IN MODULES:
7501 04 001 1 AND 7501 05 005 1
7501 04 001 3 7501 05 005 3 →



5. DRAIN THE FUEL TANK INTO A
CAN WITH A TOP TO CLOSE. CLEAN
THE FILTER SCREEN (IF THE
MOWER HAS ONE) LIKE YOU DID IN: →
MODULE 7501 04 001 1
7501 04 001 3



CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

1. REMOVED THE ENGINE RIGHT.
2. REMOVED THE CARBURETOR AND FUEL TANK RIGHT.
3. CLEANED THE FUEL TANK AND FILTER SCREEN.

"TURN THE PAGE"

WORD GUIDE 5
RE-BUILD - BUILD AGAIN

JOB STEPS

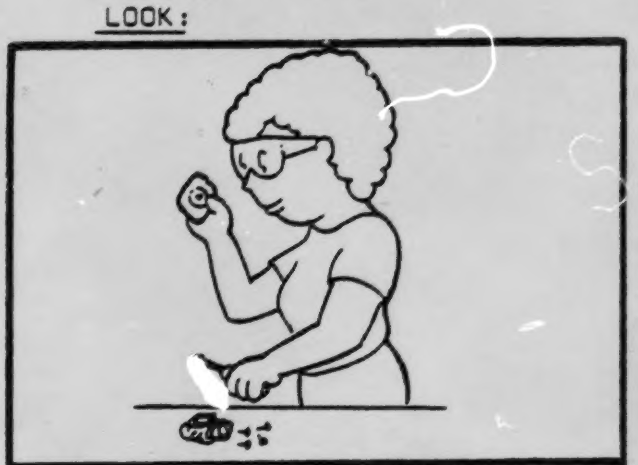
READ:

LOOK:

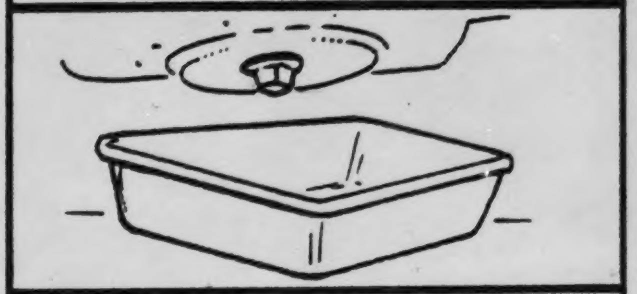
6. TAKE APART AND RE-BUILD THE CARBURETOR LIKE YOU DID IN MODULES:
7501 05 002 1   7501 05 003 1
7501 05 002 3   7501 05 003 3 →

AND

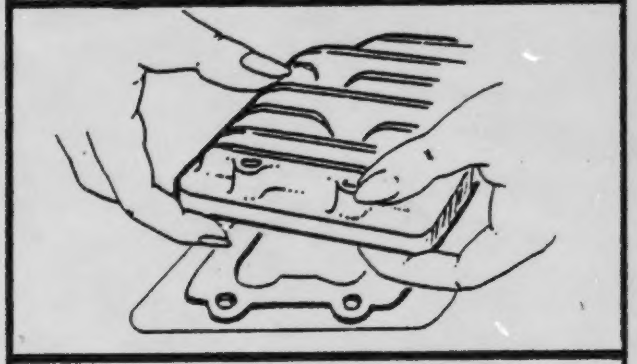
7501 05 004 1
7501 05 004 3



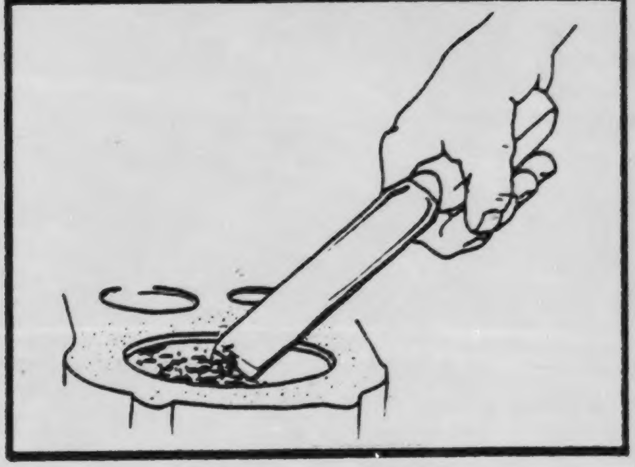
7. DRAIN THE OIL FROM THE CRANKCASE INTO A PAN OR CAN. →



8. TAKE OFF THE HEAD, LIKE YOU DID IN MODULES 7501 01 003 1
7501 01 003 3 →



9. USE A SCRAPER AND CLEAN THE CARBON OFF THE HEAD, VALVE TOPS AND PISTON TOP. →

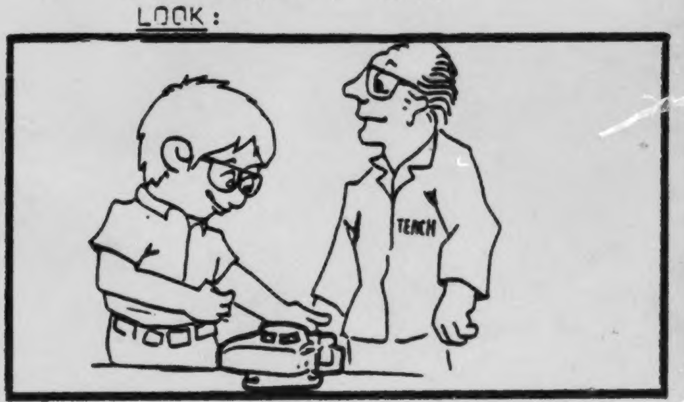


"TURN THE PAGE"

WORD GUIDE
CUSTOMER - PERSON FOR WHOM YOU ARE DOING THE JOB.

READ: JOB STEPS LOOK:

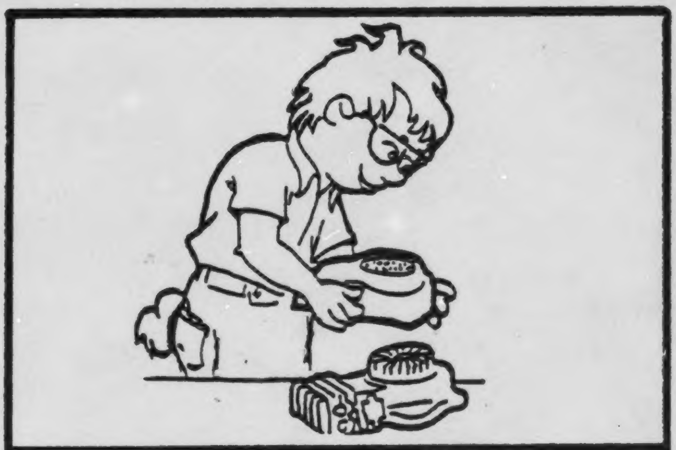
10. LOOK AT THE VALVES AND SEE IF THEY NEED TO BE GROUND. ASK YOUR INSTRUCTOR TO CHECK THEM TOO. IF THEY NEED TO BE GROUND, TELL THE CUSTOMER BEFORE YOU DO IT. A VALVE JOB WILL COST MORE SO THE CUSTOMER MUST KNOW BEFORE YOU DO THE WORK. →



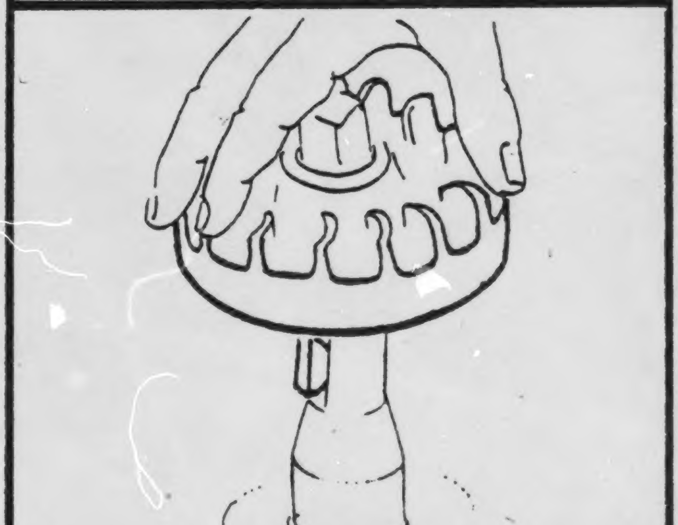
CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

1. REBUILT THE CARBURETOR RIGHT.
2. DRAINED THE CRANKCASE OIL.
3. TAKEN OFF THE HEAD.
4. CLEANED THE VALVES, HEAD, AND PISTON TOP.
5. TOLD THE CUSTOMER IF A VALVE JOB IS NEEDED.

11. TAKE OFF THE FLYWHEEL SHROUD. →



12. TAKE OFF THE FLYWHEEL. THERE IS A RIGHT WAY FOR EACH ENGINE, SO BE SURE YOU KNOW BEFORE STARTING. SEE MODULES: 7501 08 001 1/7501 08 001 3 AND/OR ASK YOUR INSTRUCTOR IF YOU HAVE ANY QUESTIONS. →



TURN THE PAGE

WORD GUIDE

JOB STEPS

GUIDELINES - RULES

READ:

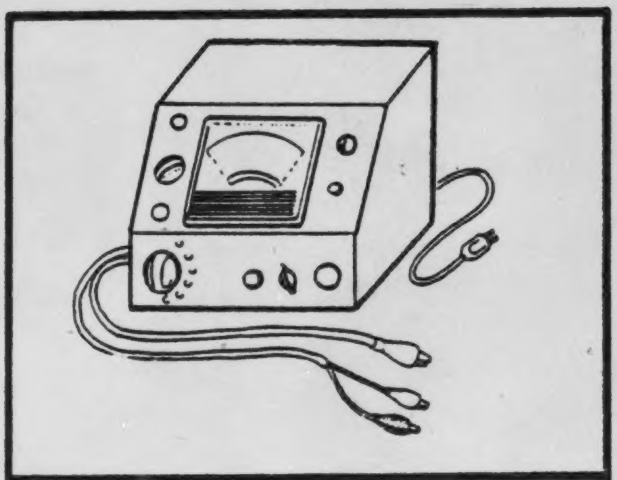
LOOK:

13. CLEAN THE MAGNETO AREA.

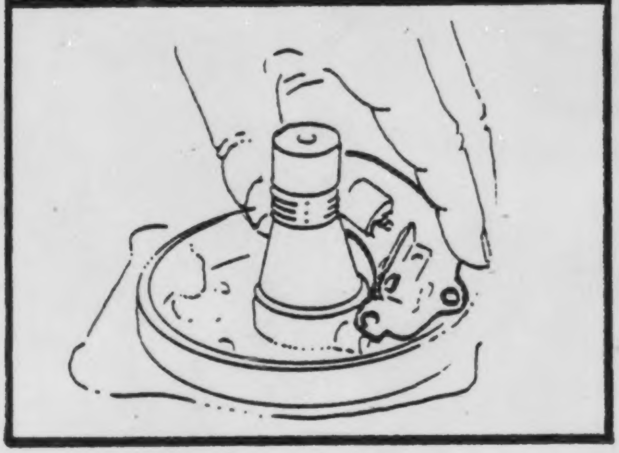
CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

1. TAKEN OFF THE FLYWHEEL SHROUD.
2. REMOVED THE FLYWHEEL.
3. CLEANED THE MAGNETO AREA.

14. USE THE MERCOTRONIC TESTER TO CHECK THE MAGNETO. →



15. PUT IN NEW POINTS AND CONDENSER AND SET TO RIGHT GUIDELINES (SEE MODULE 7501 08 003 1
7501 08 003 3). →

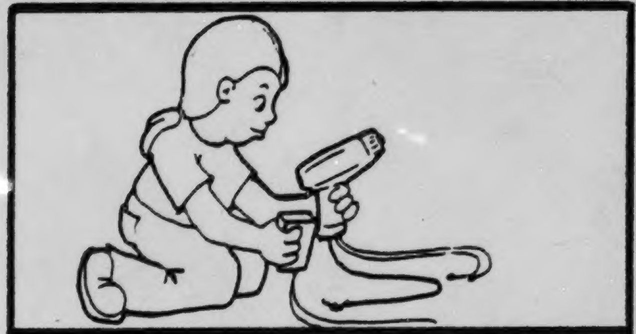


"TURN THE PAGE"

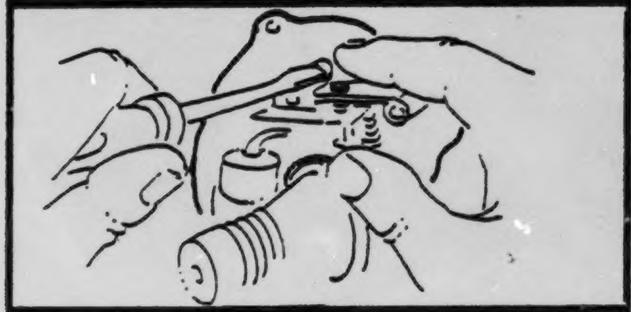
JOB STEPS

READ: LOOK:

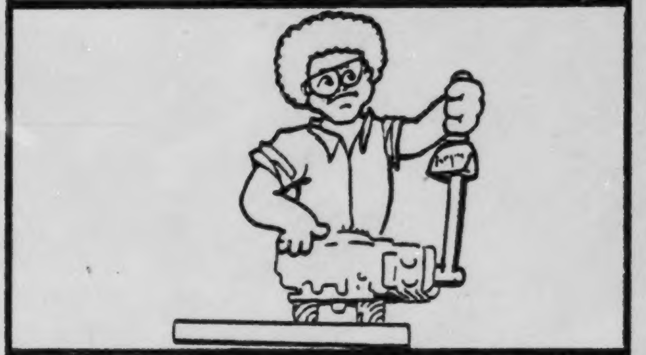
16. IF THE MAGNETO IS THE TYPE THAT NEEDS TIMING, SET THE TIMING LIKE YOU DID IN
MODULES: 7501 14 001 1
7501 14 001 3.



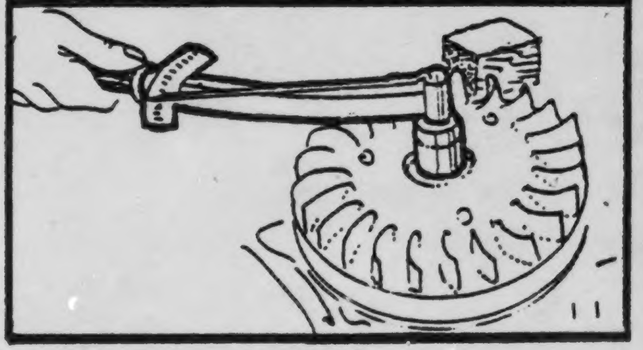
17. PUT THE MAGNETO BACK TOGETHER, LIKE YOU DID IN
MODULES: 7501 08 003 1
7501 08 003 3.



18. PUT THE HEAD BACK ON AND USE THE TORQUE WRENCH TO TORQUE IT DOWN, LIKE YOU LEARNED IN
MODULES: 7501 02 001 1
7501 02 001 3.



19. PUT THE FLYWHEEL BACK ON AND USE THE TORQUE WRENCH TO MAKE THE BOLT TIGHT AS IT SHOWS IN THE GUIDELINES.



CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

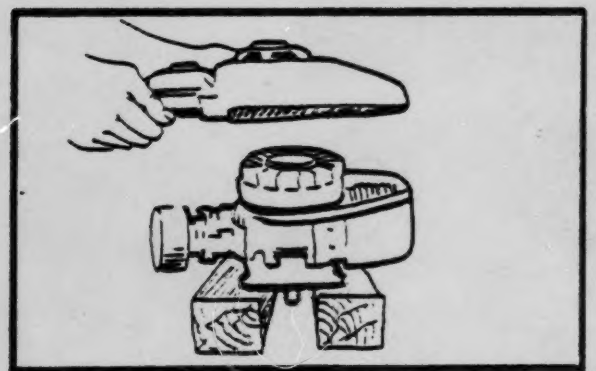
1. CHECKED THE MAGNETO.
2. PUT IN THE NEW POINTS RIGHT AND PUT IN THE CONDENSER.
3. TIMED THE MAGNETO, IF NEEDED.
4. RE-BUILT THE MAGNETO RIGHT.
5. PUT THE HEAD AND FLYWHEEL BACK ON AND TORQUED THEM RIGHT.

"TURN THE PAGE"

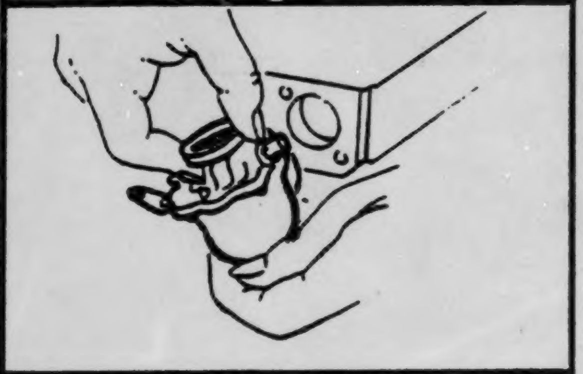
JOB STEPS

READ: LOOK:

20. PUT THE FLYWHEEL SHROUD BACK ON. →

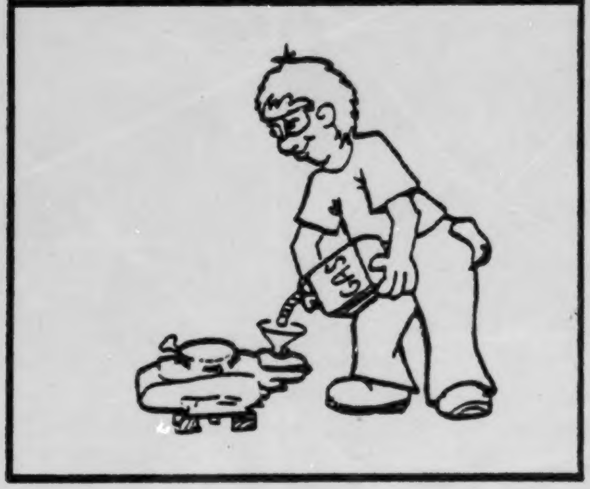


21. PUT THE FUEL TANK AND CARBURETOR BACK ON. →



22. PUT OIL IN THE ENGINE, LIKE
YOU DID IN MODULE 7501 09 001 1
7501 09 001 3.

23. PUT GAS IN THE FUEL TANK. →



CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

1. PUT THE FLYWHEEL SHROUD BACK ON.
2. PUT THE FUEL TANK AND CARBURETOR BACK ON.
3. PUT OIL AND GAS IN THE RIGHT PLACES.

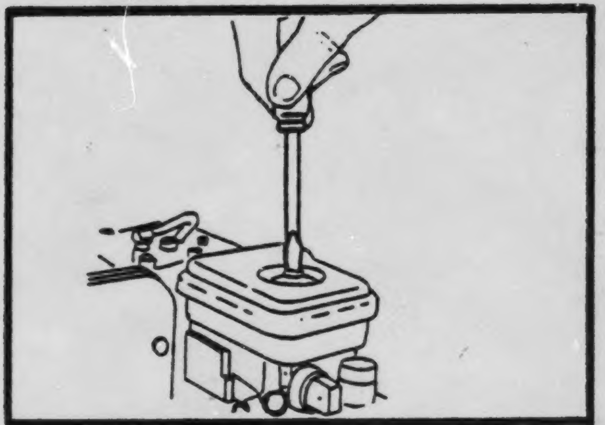
"TURN THE PAGE"

JOB STEPS

READ:

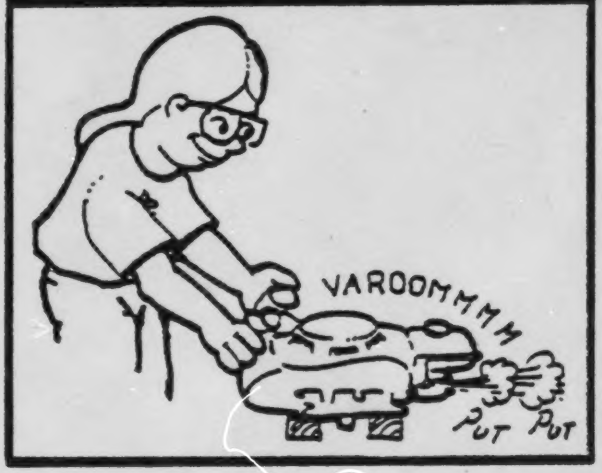
LOOK:

24. CLEAN AND PUT IN THE AIR CLEANER LIKE YOU DID IN MODULES: 7501 02 001 1
7501 02 001 3.

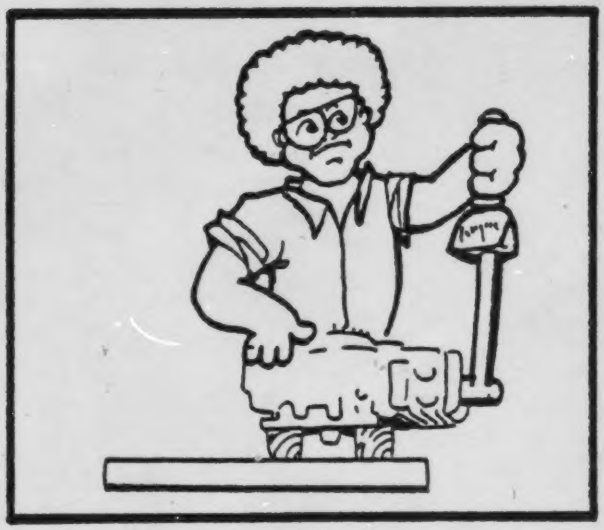


25. START UP THE ENGINE AND LET IT WARM UP FOR 2 OR 3 MINUTES.

26. AFTER 2 OR 3 MINUTES, SHUT OFF THE ENGINE.



27. TORQUE THE HEAD BOLTS AGAIN LIKE YOU DID IN MODULES:
7501 09 001 1
7501 09 001 3.

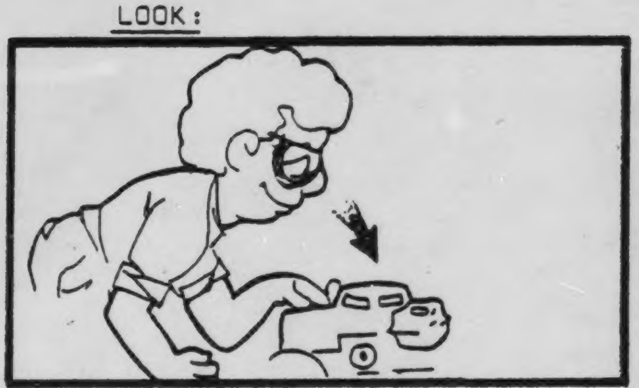


"TURN THE PAGE"

JOB STEPS

READD: LOOK:

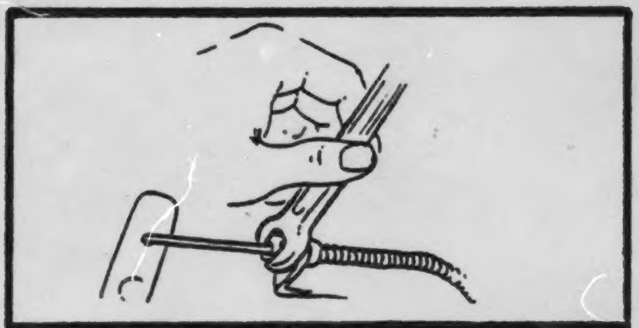
28. CHECK FOR LEAKS AT THE GAS LINE, HEAD GASKET AND FUEL TANK. →



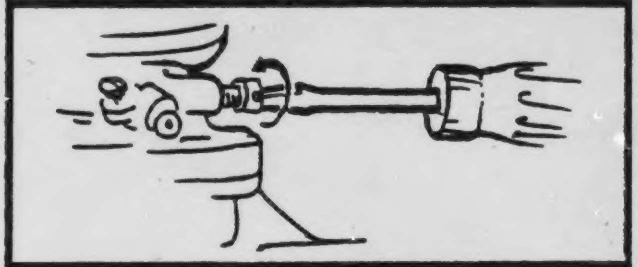
CHECK: ASK YOUR INSTRUCTOR TO CHECK YOUR WORK. YOUR INSTRUCTOR WILL CHECK:

1. THE AIR FILTER.
2. HOW WELL THE ENGINE RUNS.
3. FOR ANY LEAKS.
4. THE TORQUE OF THE HEAD BOLTS.

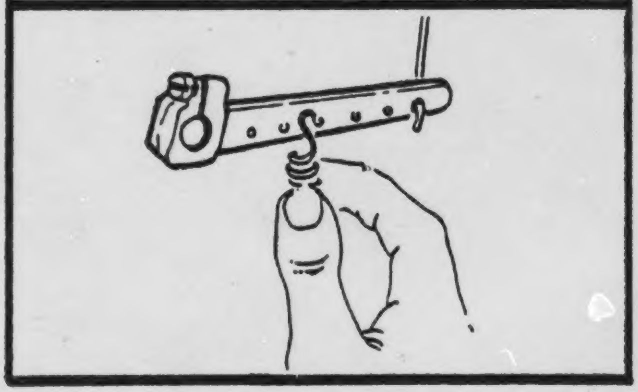
29. START THE ENGINE. SET THE THROTTLE AND THE IDLE SPEED. →



30. SET THE HIGH SPEED JETS, LIKE YOU DID IN MODULES:
7501 05 001 1
7501 05 001 3. →



31. SET THE SPEED GOVERNOR TO THE RIGHT GUIDELINES LIKE YOU DID IN MODULES: 7501 05 006 1
7501 05 006 3. →



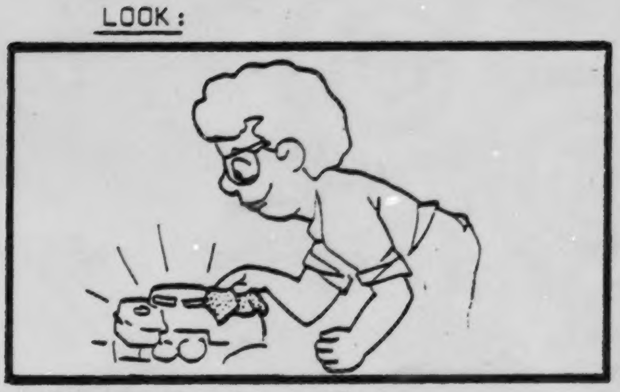
"TURN THE PAGE"

JOB STEPS

READ:

LOOK:

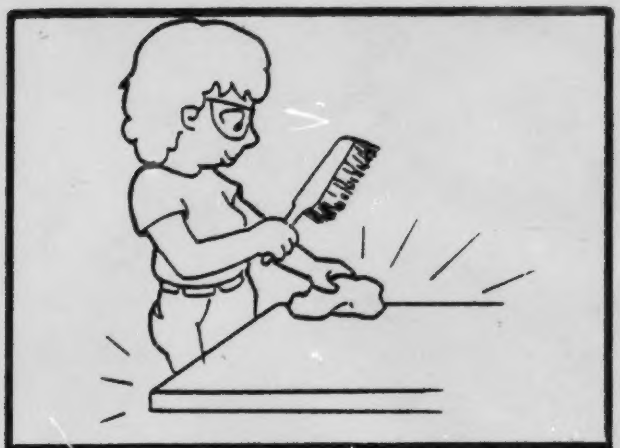
32. CLEAN UP THE MOWER. BE SURE TO GET ANY OIL AND GRASS OFF THE MACHINE.



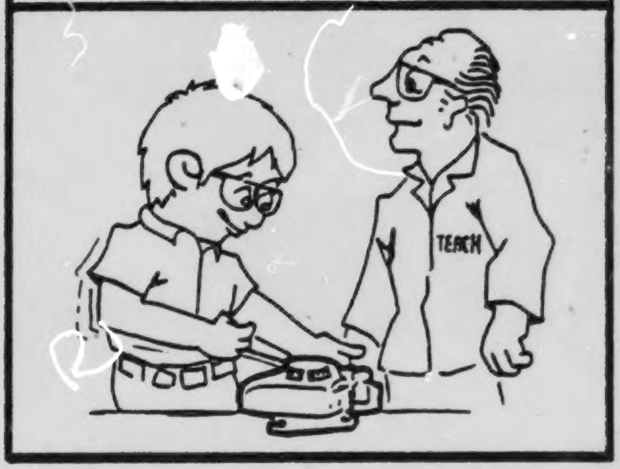
CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

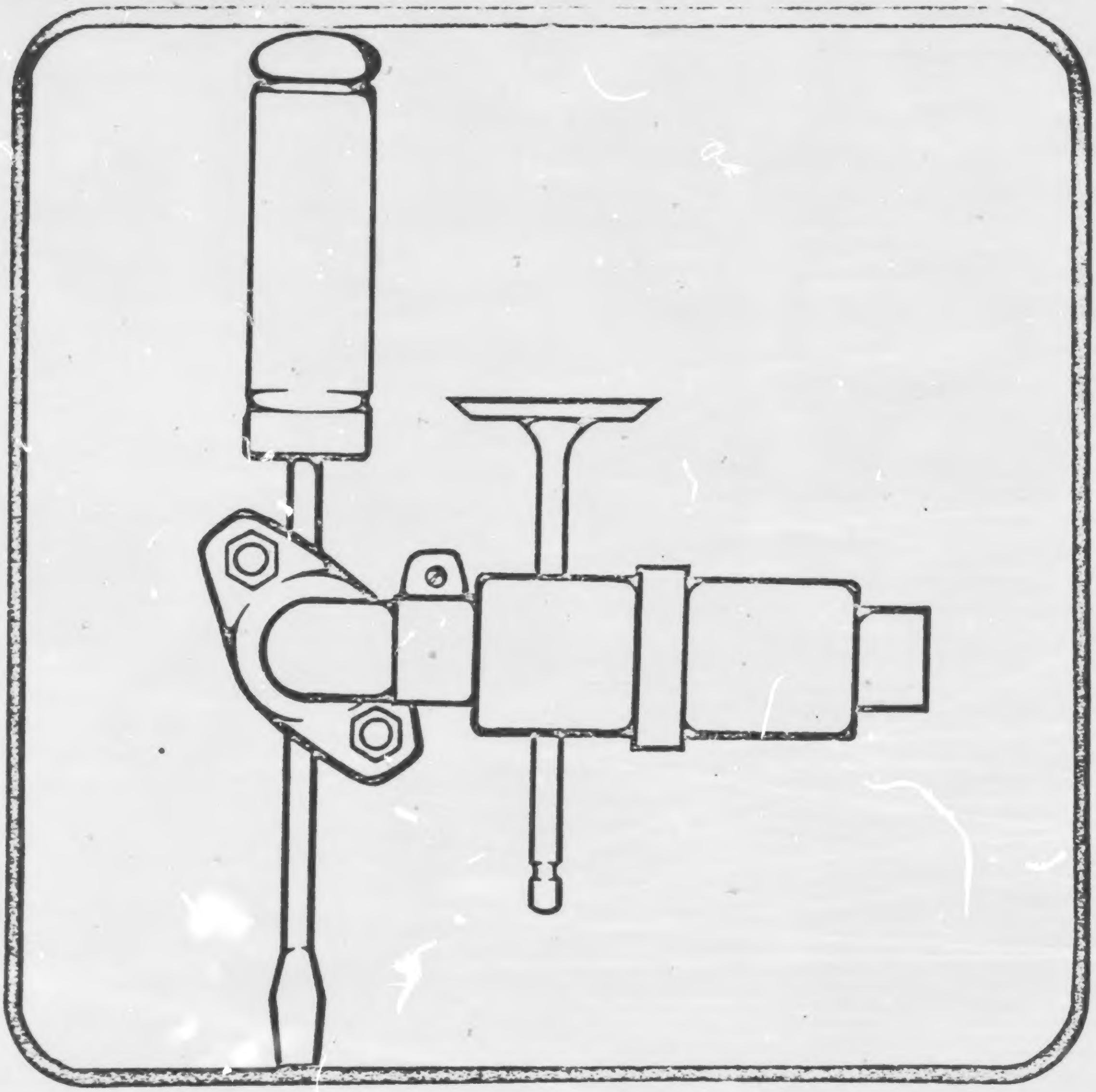
1. SET THE THROTTLE AND IDLE SPEED.
2. SET THE HIGH SPEED JETS.
3. SET THE SPEED GOVERNOR RIGHT.
4. CLEANED UP THE MACHINE.

33. PUT AWAY ALL THE TOOLS. BE SURE TO CLEAN UP YOUR WORK AREA.



34. ASK YOUR INSTRUCTOR TO START THE MOWER AND CHECK OUT YOUR WORK.





small engine repair

unit: TUNE UP

capital area career center

module: 7501 18 002 1
7501 18 002 3 date: DECEMBER 1977 level: IV

skill title: TUNE UP ENGINE ON RIDING MOWER (MINOR)

developed & written by: JIM PITTS, DON FOSTER & DWIGHT SMITH

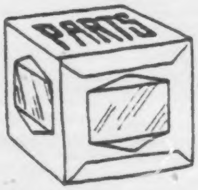
visuals by: DAVE [illegible]EHRWEIN & STEVE BRAMER

PERFORMANCE OBJECTIVE

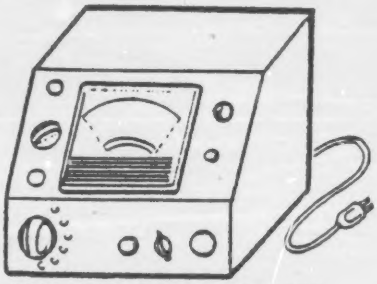
YOU ARE GOING TO LEARN:

HOW TO TUNE UP AN AIR COOLED ENGINE ON A RIDING LAWN MOWER.

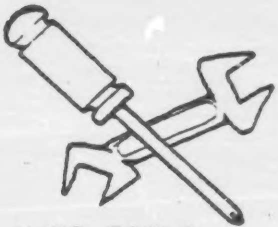
IN ORDER TO DO THIS YOU WILL NEED:



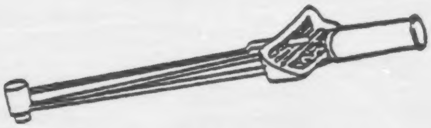
TUNE UP PARTS



MERCOTRONIC TESTER



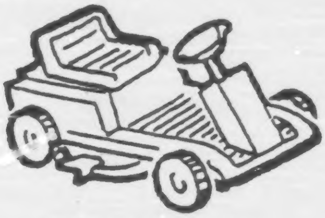
HAND TOOLS



TORQUE WRENCH

MANV.
MANUAL

SERVICE MANUAL



RIDING LAWN MOWER

SAFETY GLASSES

WE WILL KNOW YOU CAN DO IT WHEN:

1. YOU HAVE ALL THE EQUIPMENT AND SUPPLIES FOR THIS MOD.
2. YOU HAVE FOLLOWED THE JOB STEPS TO TUNE UP THE ENGINE.
3. YOU HAVE STARTED THE ENGINE IN THREE PULLS OR LESS, OR IF IT HAS ELECTRIC START, IT STARTS WITHIN 30 SECONDS.
4. THE ENGINE RUNS AT THE PROPER IDLE WHEN WARM AND RUNS UP TO THE MAXIMUM RPM AS SPECIFIED IN THE SERVICE MANUAL.
5. YOU HAVE PUT AWAY ALL TOOLS AND SUPPLIES AND CLEANED UP THE WORK AREA.

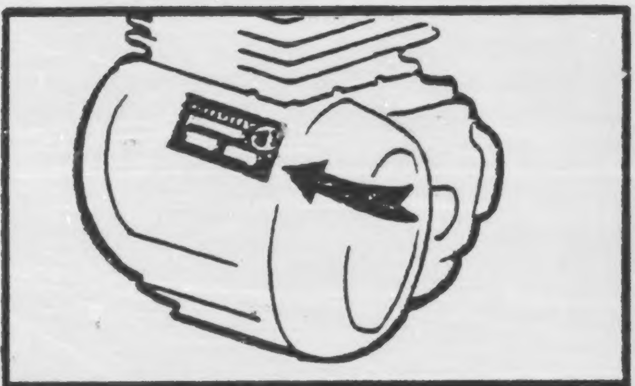
"TURN THE PAGE"

JOB STEPS

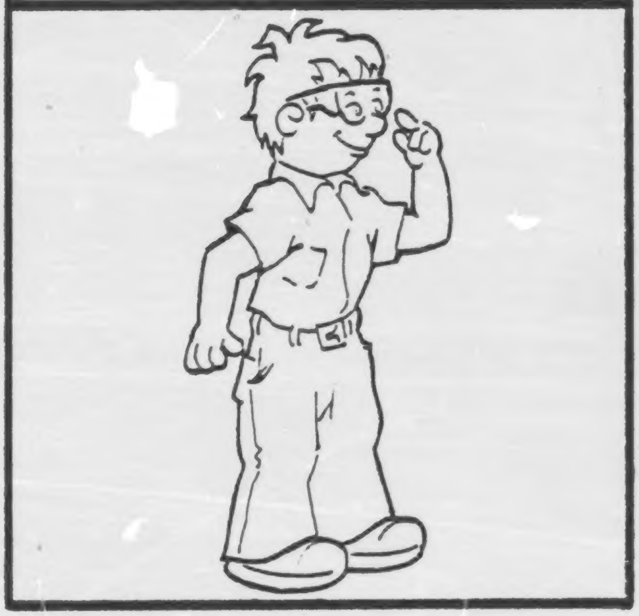
READ:

LOOK:

1. TAKE THE MATERIALS LISTED ON PAGE 2 OF THIS MODULE AND GO TO THE WORK AREA.



2. CHECK THE ENGINE SERIAL NUMBER AND MODEL. LOOK IN THE SERVICE MANUAL AND BE SURE YOU HAVE THE RIGHT MANUAL.



3. BE SURE YOUR SAFETY GLASSES ARE ON.

CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

1. ALL THE MATERIALS YOU NEED
2. YOUR SAFETY GLASSES ON
3. THE RIGHT MANUAL FOR THE ENGINE

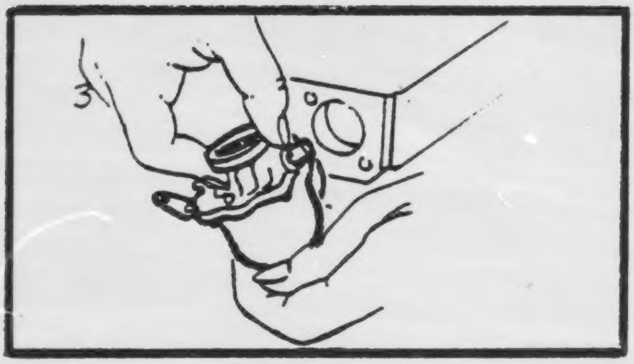
4. TAKE THE HOOD OFF IF IT IS IN YOUR WAY.

"TURN THE PAGE"

JOB STEPS

READ: LOOK:

5. REMOVE THE CARBURETOR LIKE YOU DID IN MOD 5105 05 005 1
5105 05 005 3

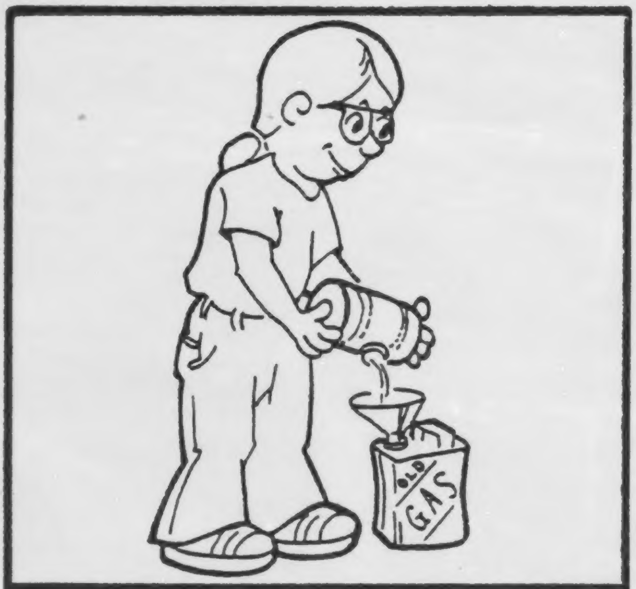


6. OVERHAUL THE CARBURETOR LIKE YOU LEARNED IN THE MOD FOR THIS KIND OF CARBURETOR.

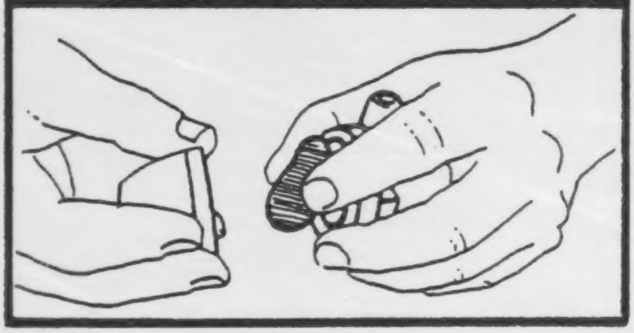
CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

1. REMOVED THE HOOD IF NEEDED
2. REMOVED AND REBUILT THE CARBURETOR.

7. DRAIN THE FUEL TANK INTO A SAFE CONTAINER.



8. CLEAN THE FUEL FILTER IF THE ENGINE HAS ONE.

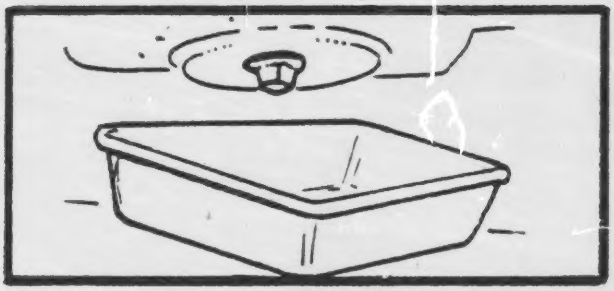


"TURN THE PAGE"

JOB STEPS

READ: LOOK:

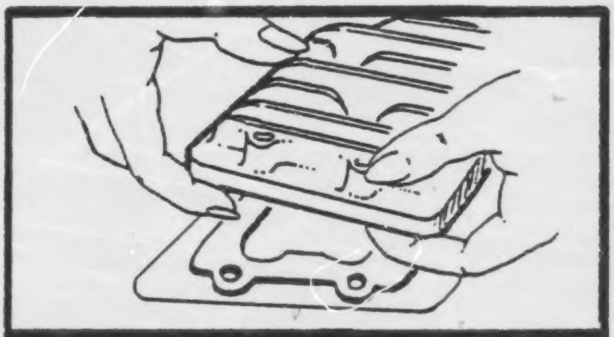
9. DRAIN THE OIL. →



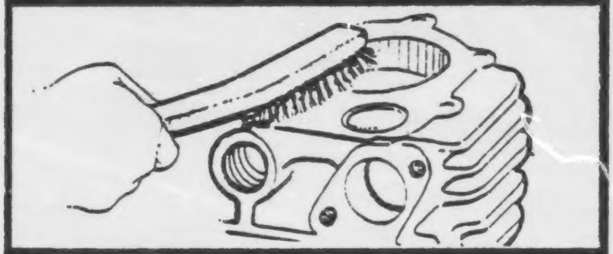
CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

1. DRAINED THE FUEL TANK
2. CLEANED THE FUEL FILTER
3. DRAINED THE OIL

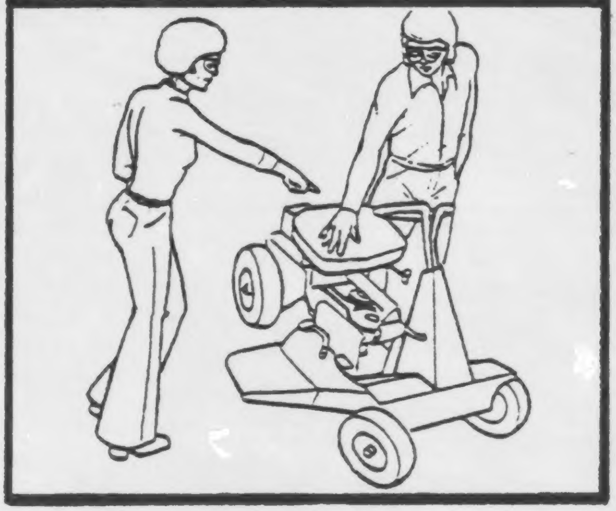
10. USE A SOCKET WRENCH TO REMOVE THE HEAD BOLTS AND THE HEAD. →



11. USE THE CARBON SCRAPER AND WIRE BRUSH TO CLEAN THE CARBON OFF THE HEAD, PISTON TOP, AND VALVE TOPS. →



12. CHECK THE VALVES TO SEE IF THEY NEED GRINDING. IF THEY DO, TELL THE CUSTOMER THAT A MAJOR TUNE UP IS NEEDED, AND IT COSTS MORE. →



"TURN THE PAGE"

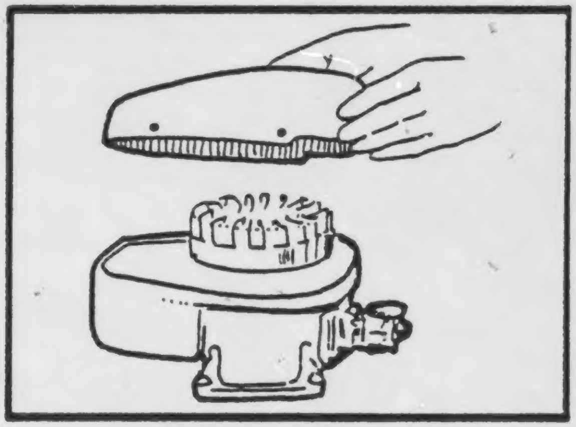
JOB STEPS

READ: LOOK:

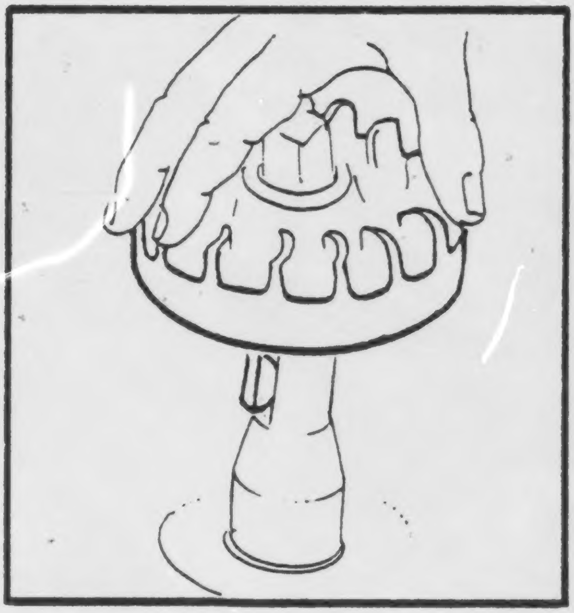
CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

1. REMOVED THE HEAD.
2. CLEANED ALL THE CARBON OFF THE HEAD, PISTON AND VALVE TOPS.
3. CHECKED THE VALVES AND DECIDED IF THEY NEED GRINDING OR NOT.

13. TAKE THE AIR HOUSING OFF. →



14. CAREFULLY REMOVE THE FLYWHEEL. →



CAUTION: THERE IS A RIGHT WAY TO REMOVE EACH KIND OF FLYWHEEL. REFER TO MODULE
7501 08 009 3
7501 08 009 1

15. CLEAN THE MAGNETO AREA WITH A CLEANING BRUSH.

"TURN THE PAGE"

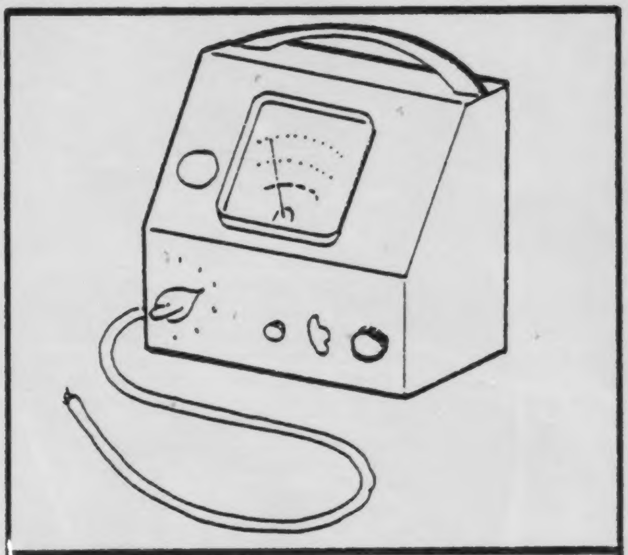
JOB STEPS

READ: LOOK:

CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

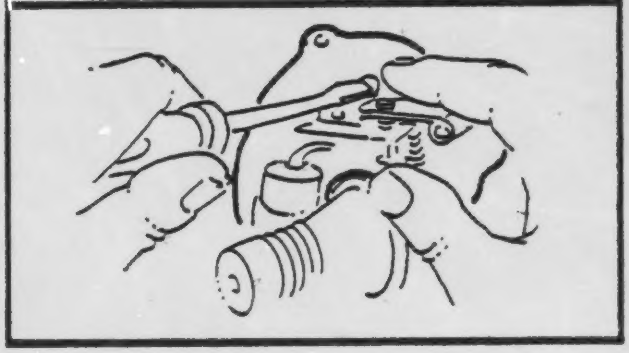
1. REMOVED THE AIR HOUSING
2. REMOVED THE FLYWHEEL IN THE RIGHT WAY
3. CLEANED THE MAGNETO AREA

16. USE THE MERCOTRONIC TESTER TO CHECK THE MAGNETO. SEE MODULE
7501 08 002 1
7501 08 002 3



17. TAKE OUT THE OLD POINTS AND CONDENSER.

18. PUT IN NEW CONDENSER AND POINTS. BE SURE TO SET THE POINTS LIKE YOU DID IN MODULE 7501 08 002 1
7501 08 002 3



CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

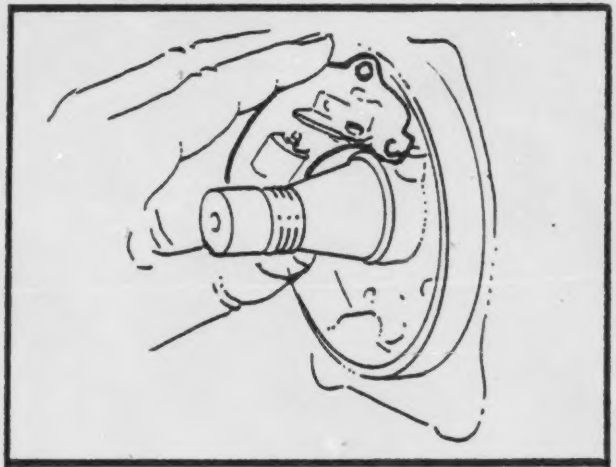
1. CHECKED THE MAGNETO
2. REPLACED AND SET THE POINTS PROPERLY
3. PUT IN NEW CONDENSER

"TURN THE PAGE"

JOB STEPS

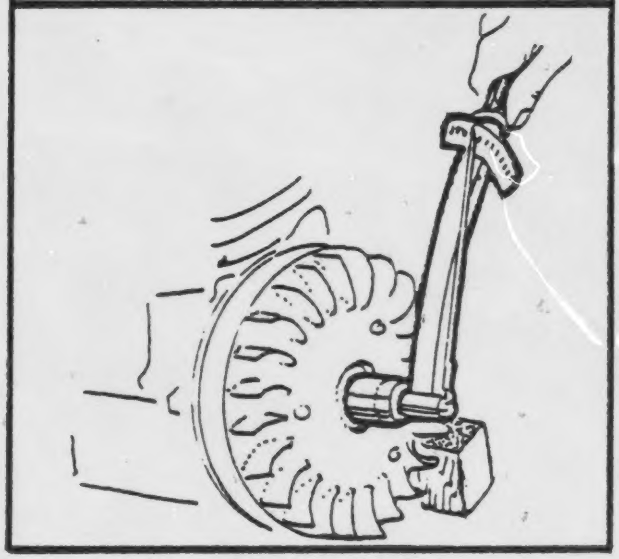
READAD:

LOOK:



19. IF THE MAGNETO IS THE TYPE THAT NEEDS TIMING, TIME IT LIKE YOU DID IN MODULE 7501 08 002 1
7501 08 002 3

20. PUT THE MAGNETO BACK TOGETHER. SEE MODULE 7501 08 003 1
7501 08 003 3 →



21. PUT THE FLYWHEEL BACK ON. USE THE TORQUE WRENCH TO TORQUE THE NUTS OR BOLTS. BE SURE TO FIND THE TORQUE SPECIFICATION IN THE SERVICE MANUAL, OR ASK YOUR INSTRUCTOR. →

CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

1. TIMED THE MAGNETO IF NEEDED.
2. PUT THE MAGNETO BACK TOGETHER IN THE RIGHT WAY
3. INSTALLED THE FLYWHEEL USING THE TORQUE SPECIFICATIONS FROM THE SERVICE MANUAL

22. CLEAN THE AIR FILTER. REFER TO MODULE 7501 02 001 1
7501 02 001 3

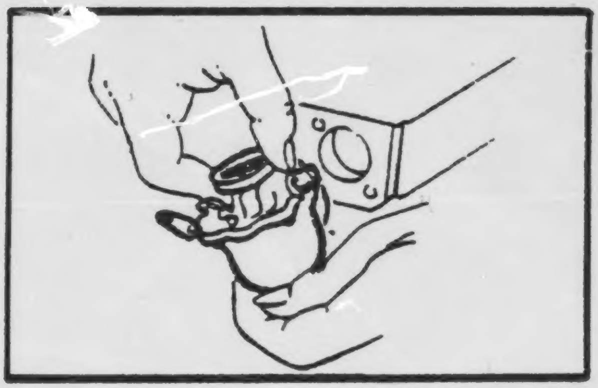
"TURN THE PAGE"

JOB STEPS

READ: LOOK:

23. PUT THE HEAD AND HEAD BOLTS ON. USE THE TORQUE WRENCH TO TORQUE IT DOWN.

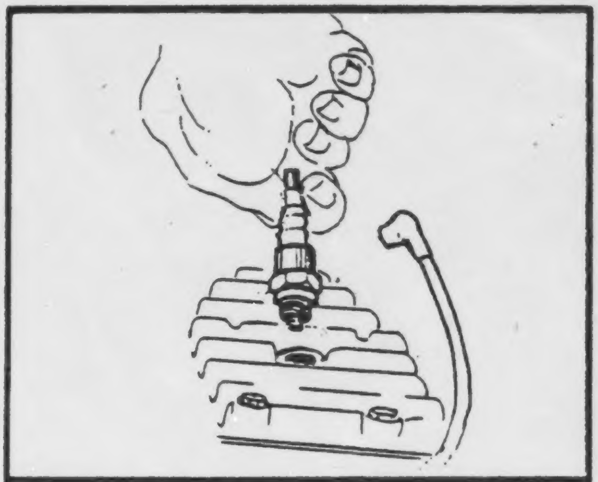
24. PUT THE CARBURETOR ON. →



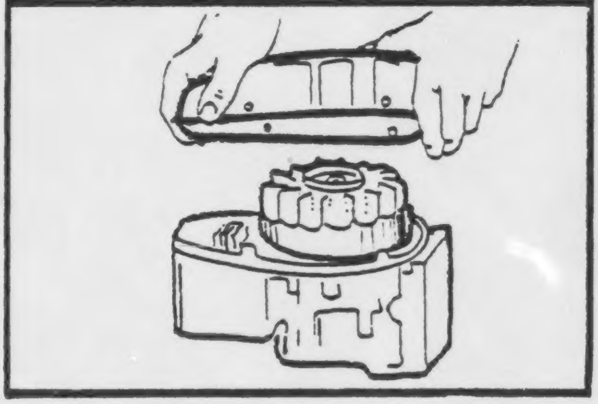
CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

1. CLEANED THE AIR FILTER
2. INSTALLED THE HEAD PROPERLY
3. PUT THE CARBURETOR ON

25. GET A NEW SPARKPLUG AND PUT IT IN. →



26. PUT THE AIR HOUSING ON. →

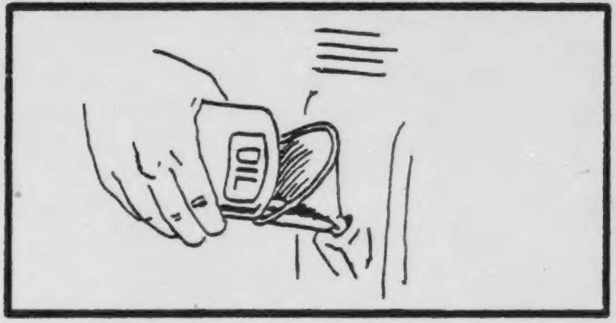


"TURN THE PAGE"

JOB STEPS

READ: LOOK:

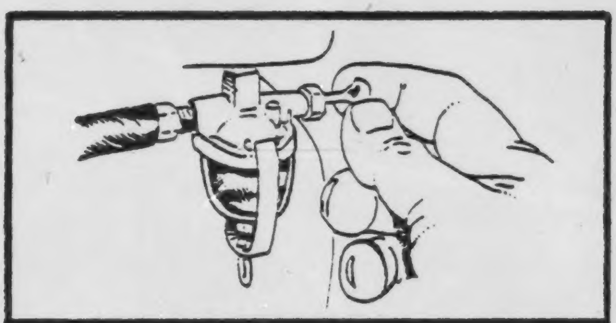
27. PUT OIL IN THE CRANKCASE. →



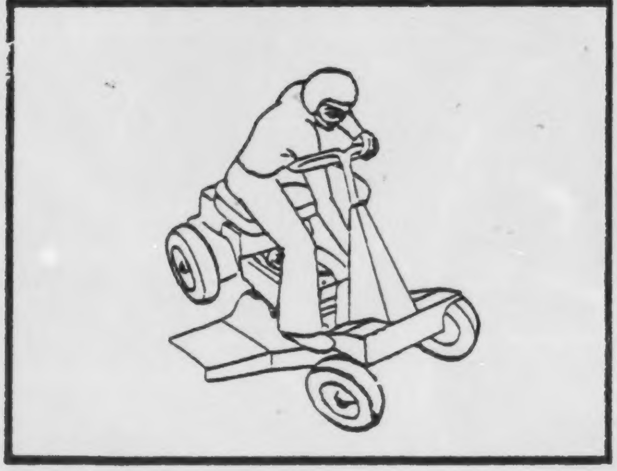
CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

1. PUT THE SPARK PLUG IN AND CONNECTED IT
2. INSTALLED THE AIR HOUSING
3. FILLED THE ENGINE WITH OIL

28. PUT SOME GAS INTO THE TANK AND OPEN THE FUEL LINE VALVE. →



29. START UP THE ENGINE AND LET IT WARM UP. SHUT IT OFF. →



30. CHECK THE TORQUE ON THE HEAD BOLTS LIKE YOU DID IN MODULE
7501 01 003 1
7501 01 003 3

"TURN THE PAGE"

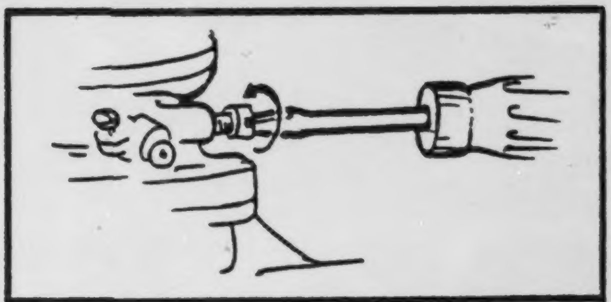
JOB STEPS

READ: LOOK:

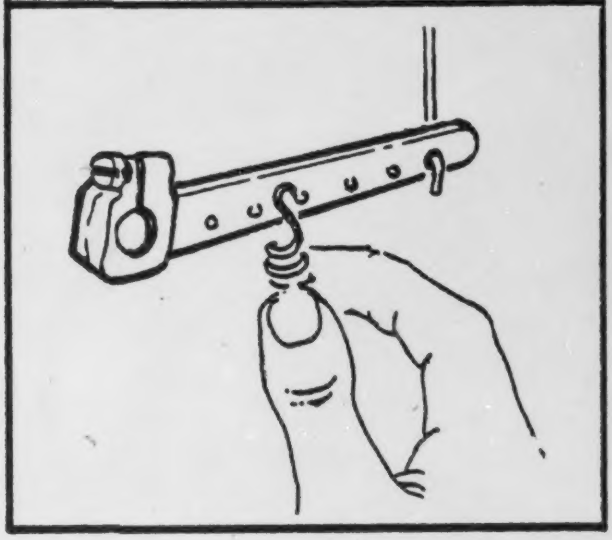
CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

1. FILLED THE GAS TANK
2. STARTED AND WARMED UP THE ENGINE
3. CHECKED THE TORQUE ON THE HEAD BOLTS

31. START THE ENGINE AND ADJUST THE THROTTLE, THE CARBURETOR IDLE AND HIGH SPEED JETS.



32. ADJUST THE GOVERNOR.



33. PUT ON THE HOOD.

CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

1. ADJUSTED THE THROTTLE AND CARBURETOR
2. ADJUSTED THE GOVERNOR
3. PUT THE HOOD ON

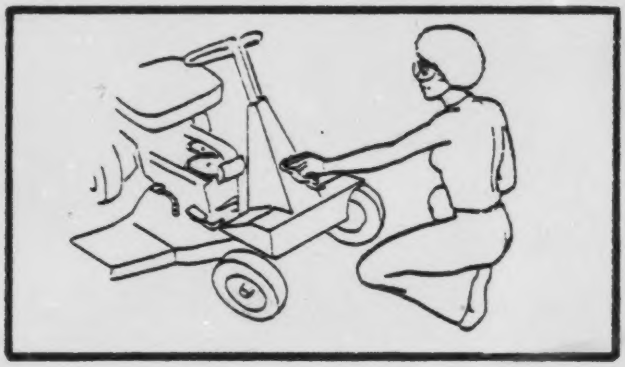
"TURN THE PAGE"

JOB STEPS

READ:

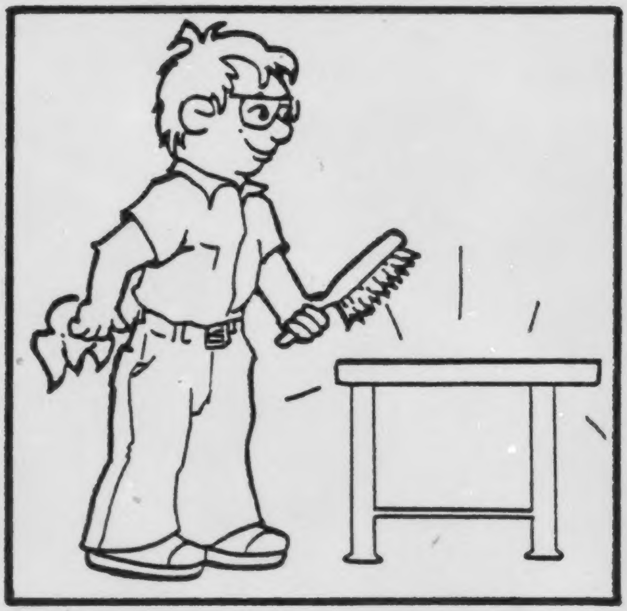
LOOK:

34. CLEAN THE MOWER FOR THE CUSTOMER.



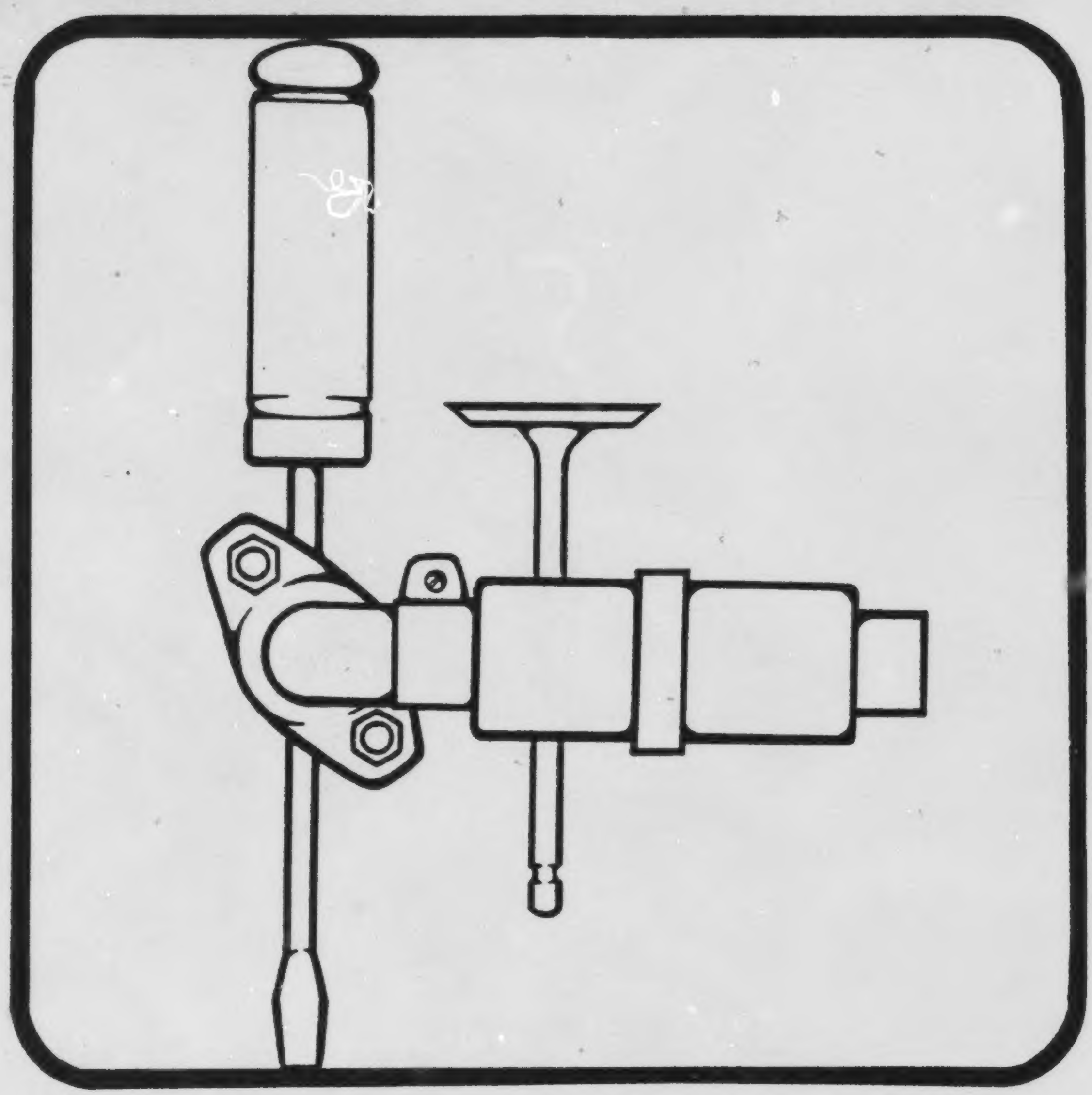
35. PUT AWAY ALL EQUIPMENT.

36. CLEAN UP THE WORK AREA.



CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

1. CLEANED UP THE MOWER
2. PUT AWAY THE TOOLS AND SUPPLIES
3. CLEANED UP THE WORK AREA.



small engine repair

unit: TUNE UP

capital area career center

module: 7501 18 003 1
7501 18 003 3 date: DECEMBER 1977 level: IV

skill title: TUNE UP ENGINE CHAINSAW

developed & written by: DON FOSTER & DWIGHT SMITH

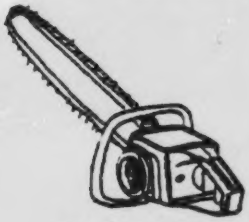
visuals by: DAVE WEHRWEIN

PERFORMANCE OBJECTIVE

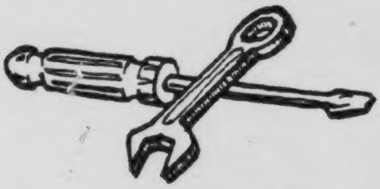
YOU ARE GOING TO LEARN:

HOW TO TUNE UP A CHAIN SAW.

IN ORDER TO DO THIS YOU WILL NEED:

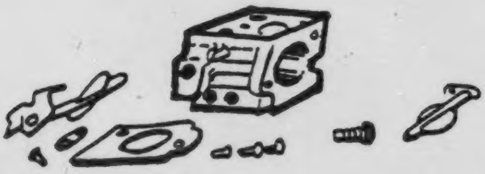


CHAIN SAW



HAND TOOLS

CHAINSAW MANUAL



REPLACEMENT PARTS

SAFETY GLASSES

WE WILL KNOW THAT YOU CAN DO IT WHEN:

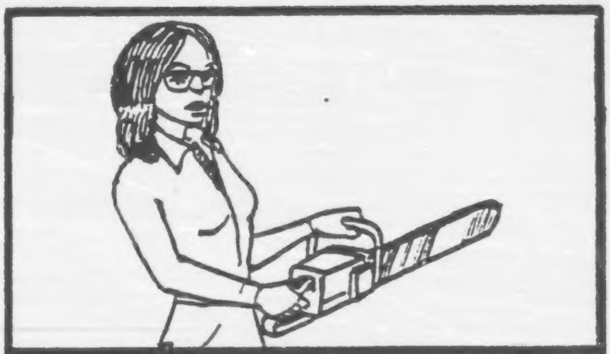
1. YOU HAVE GATHERED THE MATERIALS FOR THIS MODULE.
2. YOU HAVE STARTED THE ENGINE IN 5 PULLS OR LESS.
3. THE ENGINE RUNS SMOOTHLY UNDER LOAD.
4. THE BLADE DOES NOT RUN WHEN THE ENGINE IS AT IDLE.

"TURN THE PAGE"

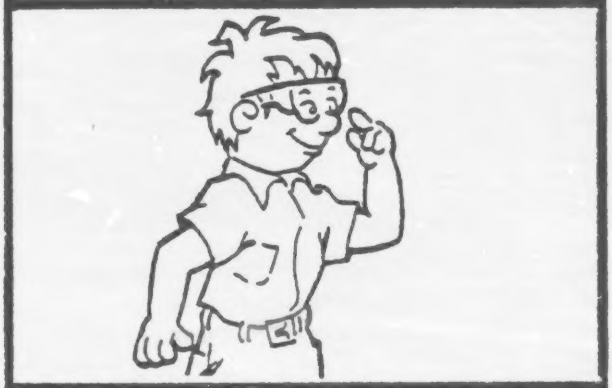
JOB STEPS

READ: LOOK:

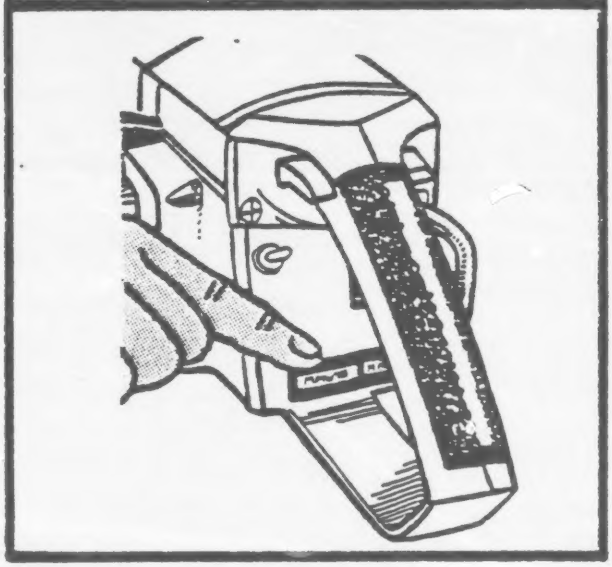
1. GET THE MATERIALS AND SUPPLIES YOU NEED AND GO TO THE WORK AREA. →



2. PUT ON YOUR SAFETY GLASSES. →



3. CHECK THE ENGINE MODEL AND SERIAL NUMBER AND BE SURE YOU HAVE THE RIGHT SERVICE MANUAL. →



CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

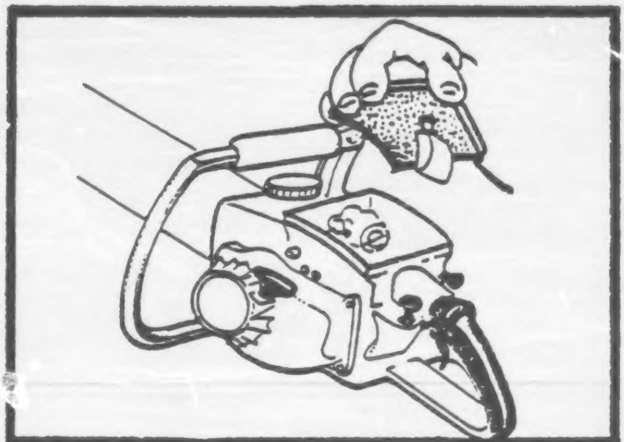
1. ALL THE MATERIALS YOU NEED.
2. THE RIGHT MANUAL FOR THE SAW.
3. YOUR SAFETY GLASSES ON.

"TURN THE PAGE"

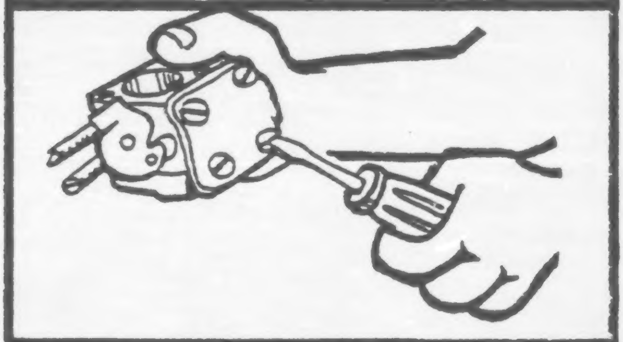
JOB STEPS

READD: LOOK:

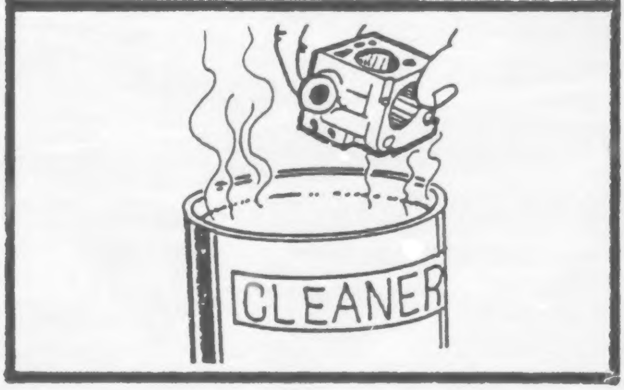
4. TAKE THE AIR FILTER OFF. CHECK IT FOR DIRT.



5. TAKE THE CARBURETOR OFF AND TAKE IT APART.



6. PUT THE CARBURETOR IN THE CLEANER.



CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

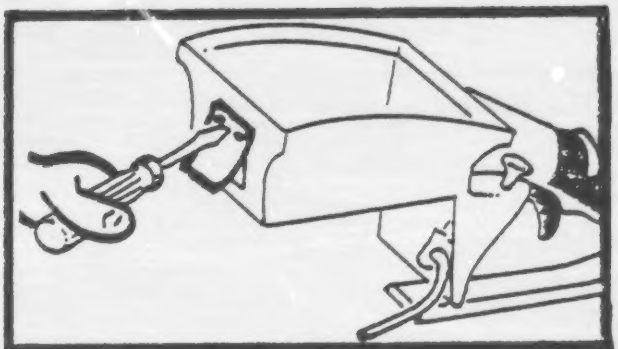
1. TAKEN THE AIR FILTER OFF.
2. TAKEN THE CARBURETOR OFF.
3. TAKEN THE CARBURETOR OFF AND PUT IT IN THE CLEANER.

"TURN THE PAGE"

JOB STEPS

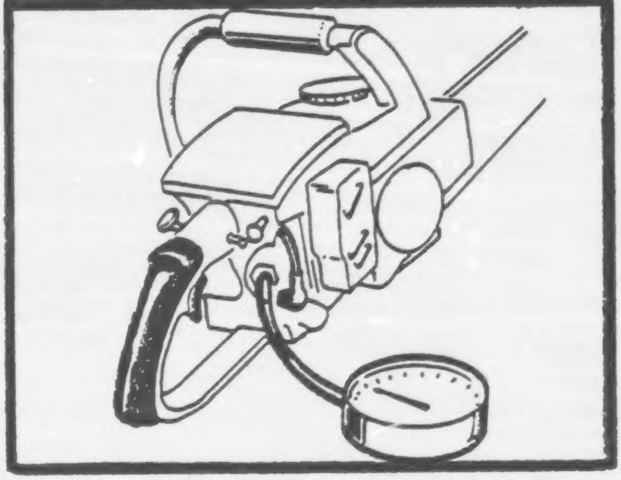
READ: LOOK:

7. CHECK THE REED PLATE FOR WEAR OR DAMAGE. LOOK FOR SMALL CRACKS OR WEAR MARKS.



8. USE THE COMPRESSION GAUGE AND CHECK THE COMPRESSION.

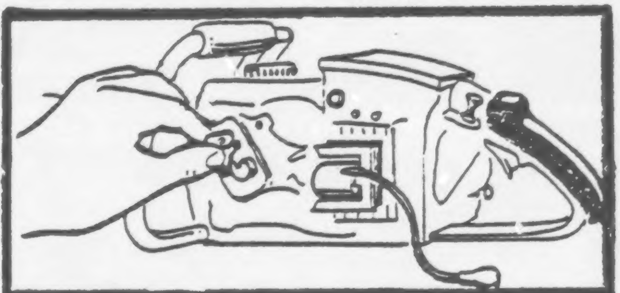
9. TAKE THE MAGNETO APART AND CHECK THE SPARK PLUG FOR WEAR & GAP.



CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

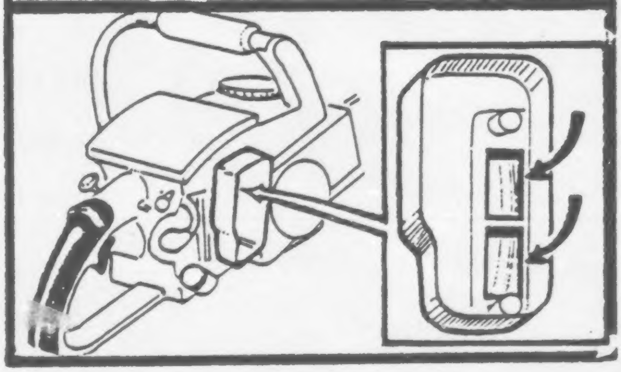
1. CHECKED THE REED PLATE.
2. CHECKED THE COMPRESSION.
3. CHECKED THE SPARK PLUG TND TAKEN THE MAGNETO APART.

10. CHECK THE COIL AND THE CONDENSER.



11. MAKE A LIST OF THE PARTS YOU NEED AND GET THE PARTS FROM THE PARTS DEPARTMENT.

12. CLEAN UP THE SAW. BE SURE THE EXHAUST PORTS ARE CLEAR.



"TURN THE PAGE"

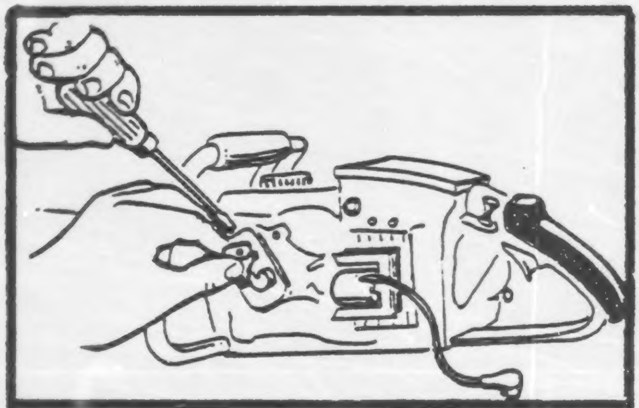
JOB STEPS

READD: LOOK:

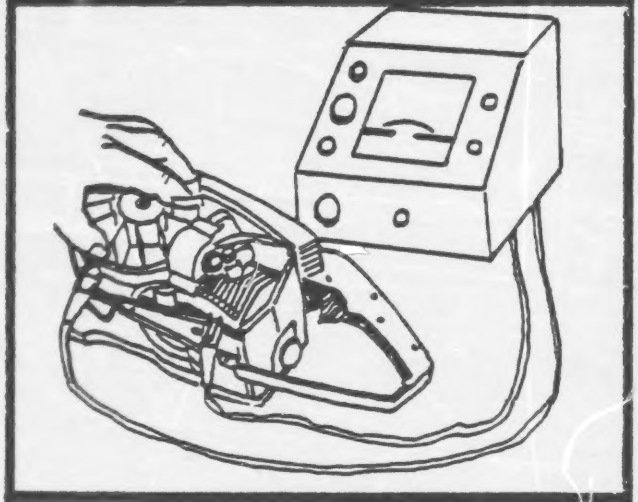
CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

1. CHECKED THE COIL AND CONDENSER.
2. ALL THE CORRECT TURN UP PARTS.
3. CLEANED UP THE SAW AND CLEARED THE EXHAUST PORTS.

13. PUT IN THE NEW POINTS AND CONDENSER. →

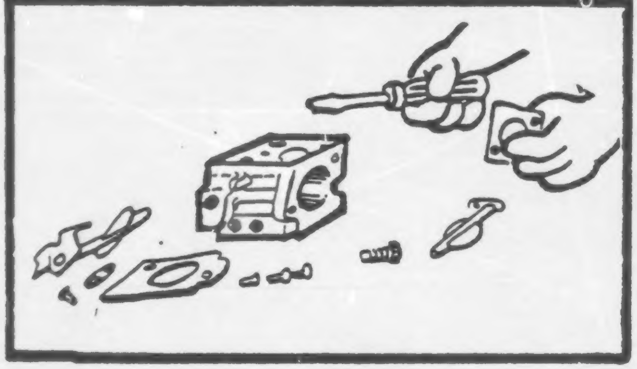


14. RE-TIME THE ENGINE IF NEEDED. →



15. PUT THE REED PLATE BACK ON IF YOU REMOVED IT.

16. A. PUT THE CARBURETOR BACK TOGETHER USING THE CARBURETOR KIT PARTS. →



"TURN THE PAGE"

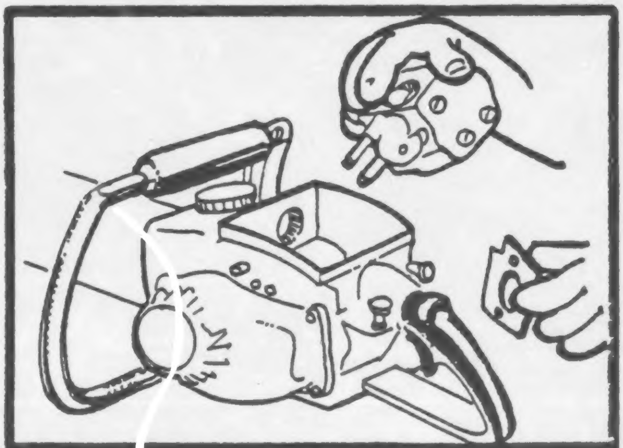
JOB STEPS

READ: LOOK:

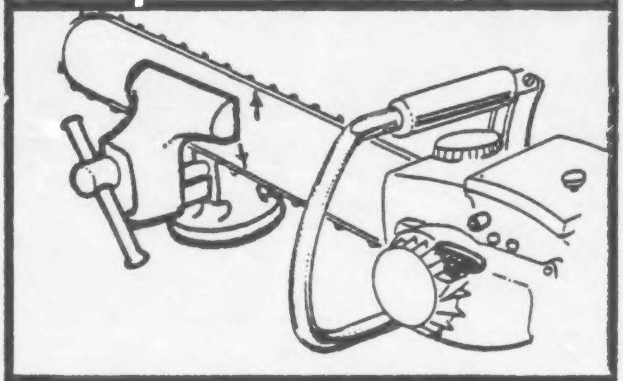
CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

1. INSTALLED THE POINTS AND CONDENSER.
2. PUT THE REED PLATE ON.
3. PUT THE CARBURETOR BACK TOGETHER IN THE RIGHT WAY.

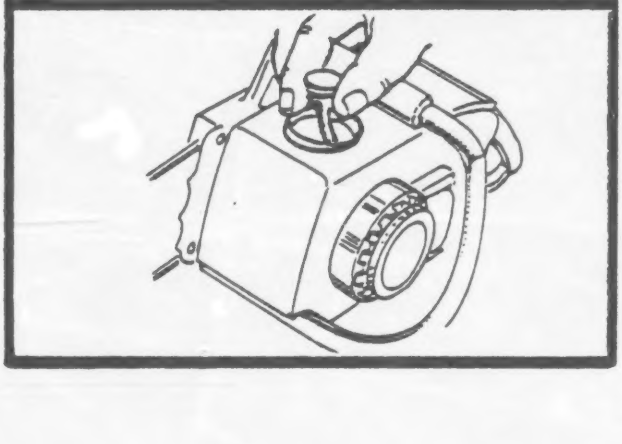
16.B. PUT ON A NEW GASKET AND THE CARBURETOR. →



17. CLAMP THE SAW BLADE IN A VISE. BE SURE THE VISE DOES NOT TOUCH THE CHAIN. →



18. TAKE OFF THE GAS CAP AND PULL OUT THE GAS LINE AND FILTER. →



19. REPLACE OR CLEAN THE FILTER. MOST SAWS HAVE A COTTON FILTER IN THE END OF THE LINE.

"TURN THE PAGE"

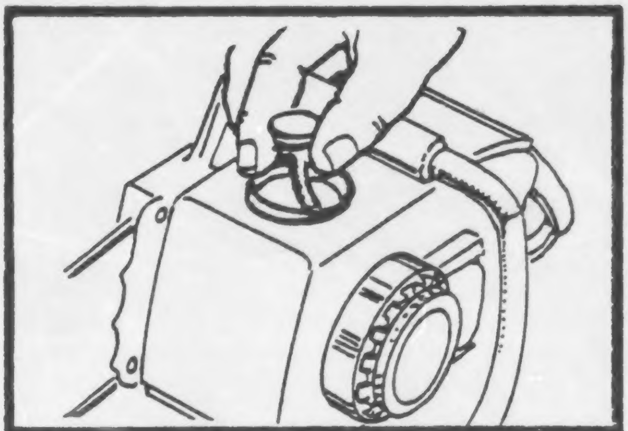
JOB STEPS

READ: LOOK:

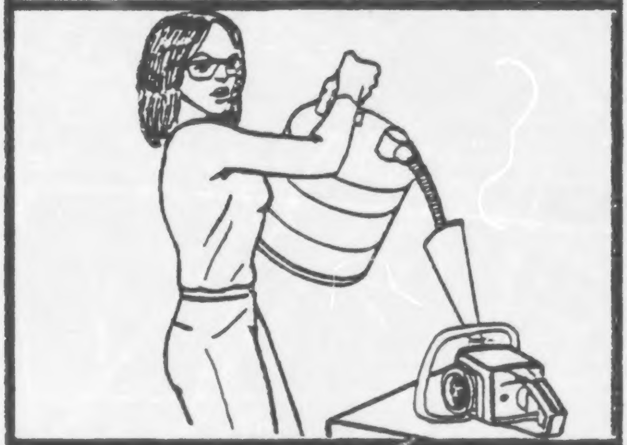
CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

1. PUT THE CARBURETOR ON.
2. CLAMPED THE SAW PROPERLY IN THE VISE.
3. SERVICED THE GAS LINE FILTER.

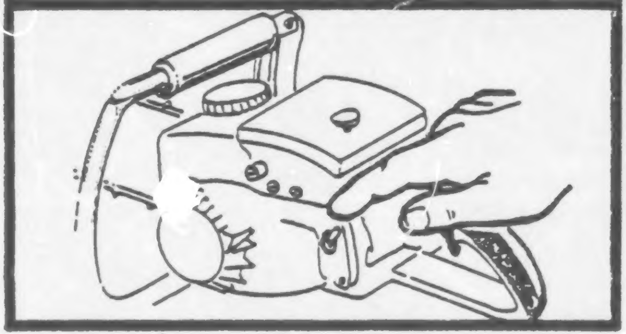
20. PUT THE GAS LINE BACK IN THE TANK.



21. FILL THE TANK WITH THE RIGHT PRE-MIXED GAS AND OIL. SEE SERVICE MANUAL FOR INFORMATION.



22. TURN IGNITION SWITCH ON. START THE ENGINE. LET IT WARM UP.



CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

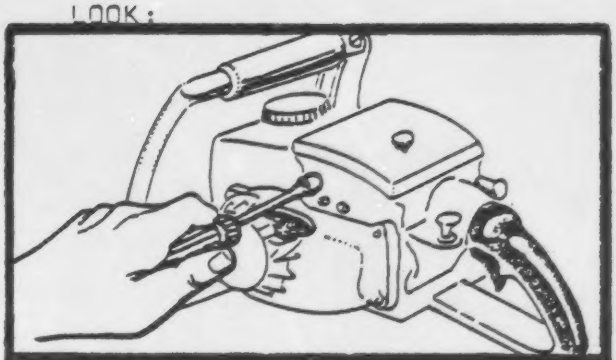
1. PUT THE GAS LINE BACK IN.
2. FILLED THE TANK WITH GAS AND OIL MIXTURE.
3. STARTED UP ENGINE.

"TURN THE PAGE"

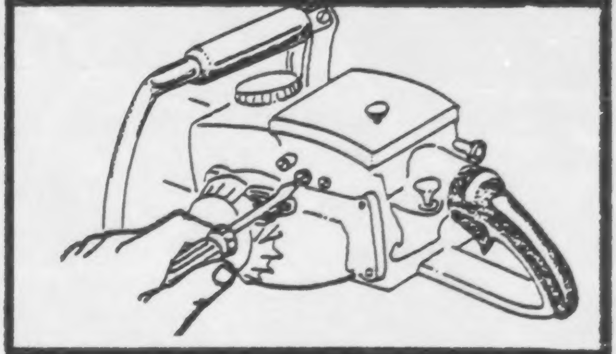
JOB STEPS

READ: LOOK:

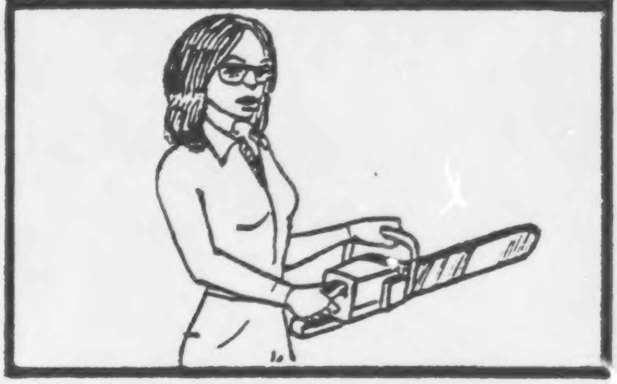
23. ADJUST THE IDLE SCREW SO THAT THE ENGINE IDLES JUST UNDER THE SPEED THAT MAKES THE CHAIN MOVE. →



24. ADJUST THE IDLE FUEL MIXTURE SO THAT ENGINE RUNS SMOOTHLY. →



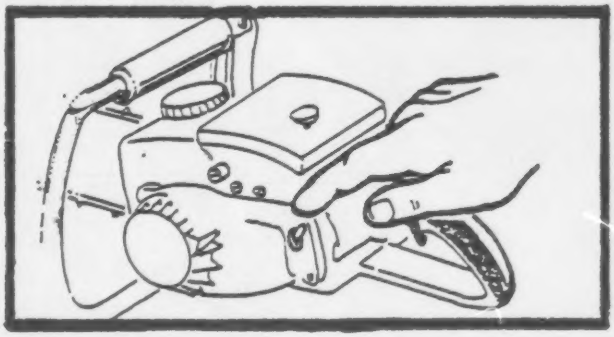
25. SHUT THE ENGINE OFF. THEN REMOVE THE SAW TO A WOODPILE OR OTHER SAFE AREA. →



CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

1. ADJUSTED THE IDLE SPEED.
2. ADJUSTED THE IDLE MIXTURE.
3. REMOVED THE SAW TO A SAFE AREA.

26. START UP THE ENGINE. →

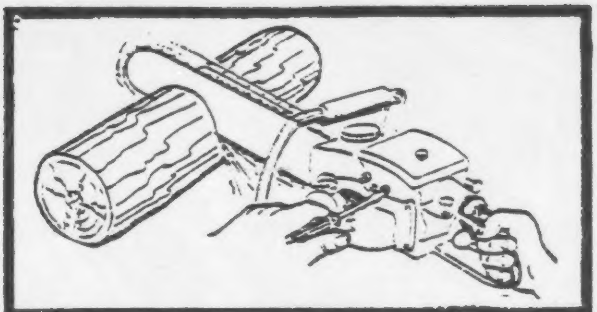


"TURN THE PAGE"

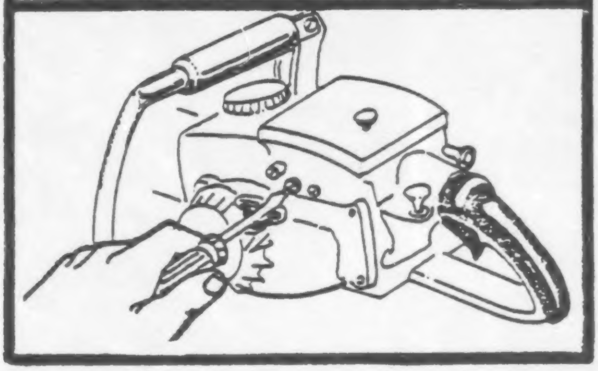
JOB STEPS

READ: LOOK:

27. WITH THE ENGINE AT FULL THROTTLE AND UNDER FULL LOAD, ADJUST THE MAIN FUEL NEEDLE SO THE ENGINE RUNS WITHOUT SMOKING. →



28. LET THE ENGINE IDLE WITHOUT LOAD. READJUST IDLE IF NEEDED. SHUT ENGINE OFF. →

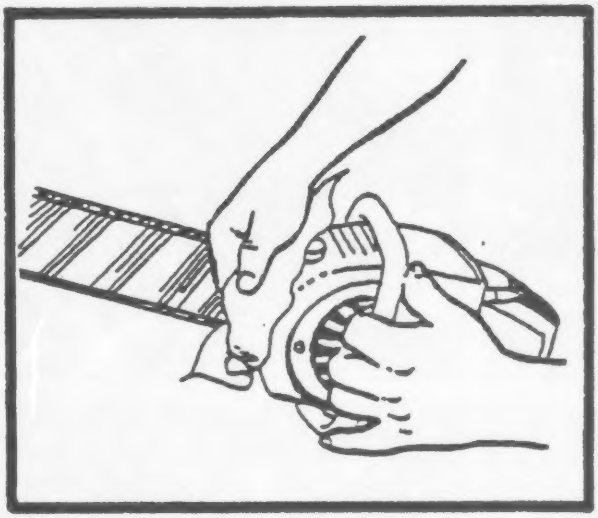


CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

1. ADJUSTED THE MAIN FUEL NEEDLE UNDER LOAD.
2. READJUSTED THE IDLE IF NEEDED.

29. PUT AWAY ALL TOOLS AND SUPPLIES.

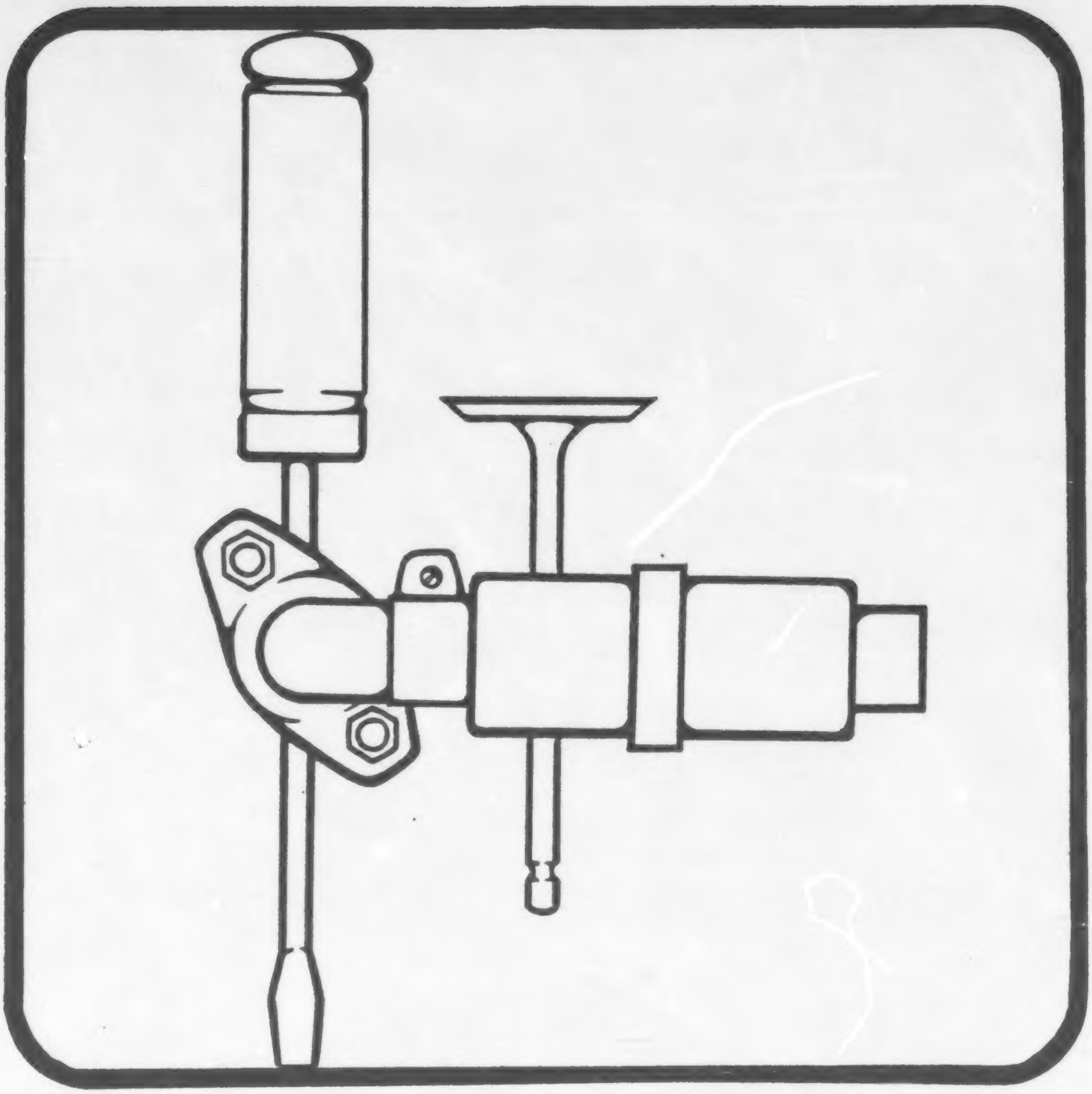
30. CLEAN UP THE SAW FOR THE CUSTOMER. →



31. CLEAN UP THE WORK AREA.

CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

1. PUT AWAY ALL THE MATERIALS.
2. CLEANED UP THE SAW.
3. CLEANED UP THE WORK AREA.



small engine repair

unit: TUNE UP

capital area career center

module: 7501 18 004 1
7501 18 004 3 date: DECEMBER 1977 level: IV

skill title: TUNE UP SNOWMOBILE ENGINE

developed & written by: DON FOSTER, JIM PITTS AND DWIGHT SMITH

visuals by: STEVE BRAMER

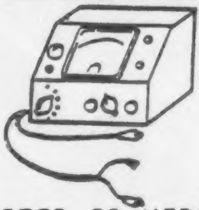
PERFORMANCE OBJECTIVE

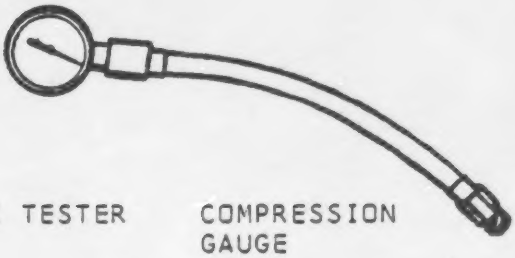
YOU ARE GOING TO LEARN:

HOW TO REMOVE, CLEAN AND REPLACE FUEL TANKS AND FUEL FILTERS.

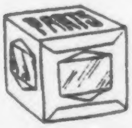
AND IN ORDER TO DO THIS YOU WILL NEED:

SNOWMOBILE ENGINE


OHMMETER OR MEROCOTRONIC TESTER

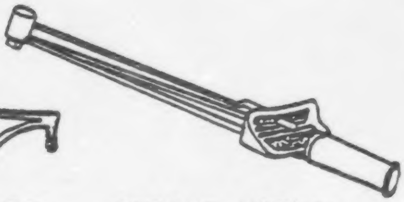

COMPRESSION GAUGE

DYNOMETER



NEW PARTS

SAFETY GLASSES


TORQUE WRENCH

SERVICE MANUAL

WE WILL KNOW THAT YOU CAN DO IT WHEN:

YOU HAVE GATHERED THE MATERIALS FOR THIS MODULE.

YOU HAVE FOLLOWED THE JOB STEPS TO TUNE UP A SNOWMOBILE ENGINE.

YOU HAVE STARTED THE ENGINE WITHIN 5 PULLS.

THE IDLE IS ADJUSTED SO THAT THE BELT DOES NOT TURN WHEN ON THE DYNOMETER.

YOU HAVE ADJUSTED THE TRACK TO MAXIMUM TOP SPEED UNDER LOAD ON THE DYNOMETER.

YOU HAVE CLEANED UP THE SNOWMOBILE AND THE WORK AREA.

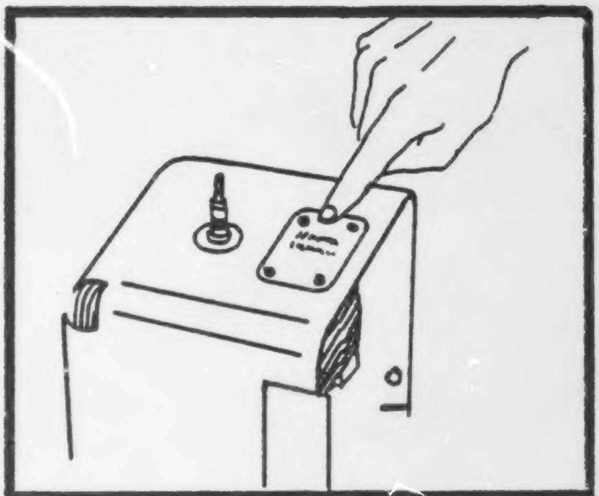
"TURN THE PAGE"

JOB STEPS

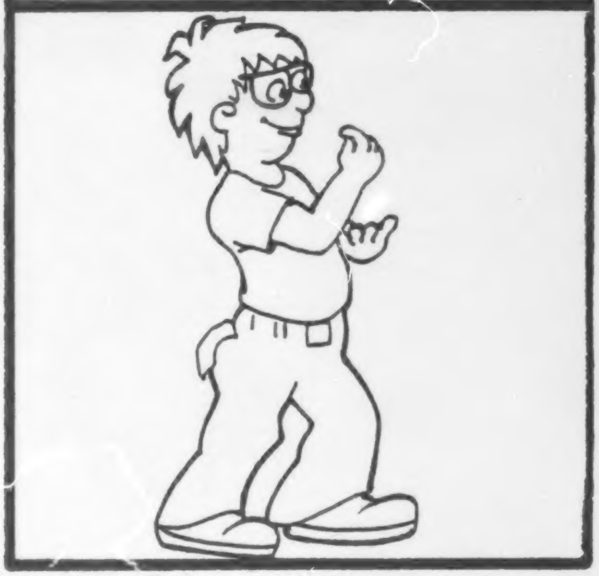
READ: LOOK:

1. TAKE ALL THE EQUIPMENT YOU NEED (LISTED ON PAGE 2) TO THE WORK AREA.

2. CHECK THE ENGINE MODEL AND SERIAL NUMBER. THEN BE SURE YOU HAVE THE RIGHT SERVICE MANUAL.



3. PUT ON YOUR SAFETY GLASSES.



CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

1. ALL THE EQUIPMENT FOR THIS MODULE.
2. THE RIGHT SERVICE MANUAL.
3. YOUR SAFETY GLASSES ON.

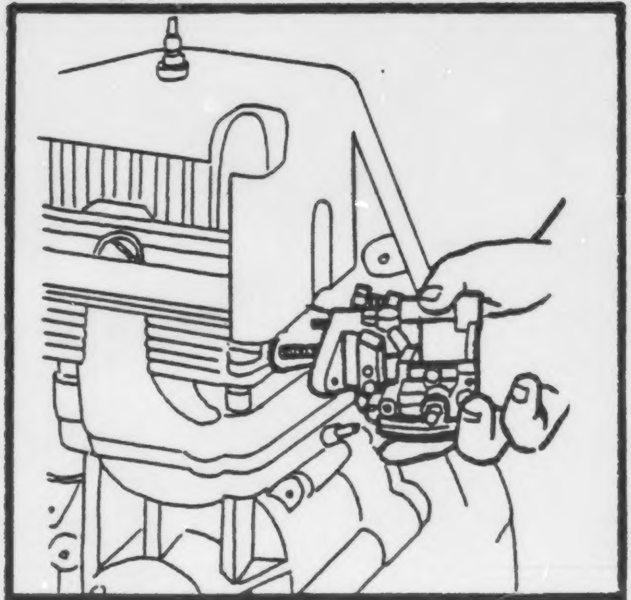
"TURN THE PAGE"

JOB STEPS

READD:

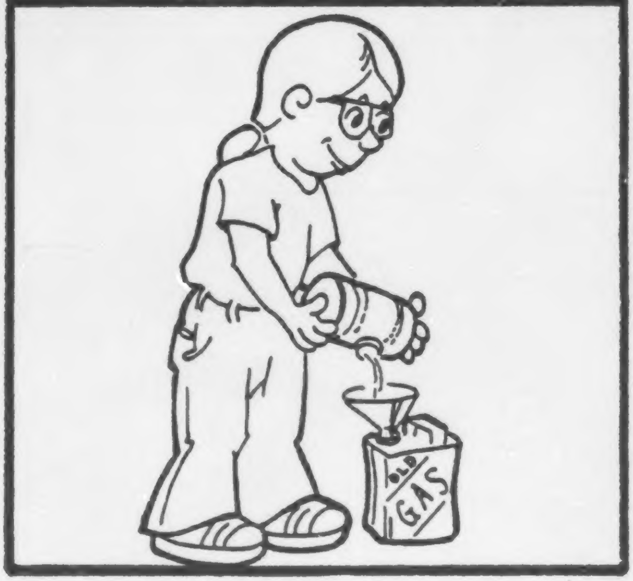
LOOK:

4. TAKE THE CARBURETOR(S) OFF THE ENGINE. →



5. OVERHAUL THE CARBURETOR AS YOU DID IN THE CARBURETOR UNIT.

6. DRAIN THE FUEL TANK INTO A SAFE CONTAINER. →



CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

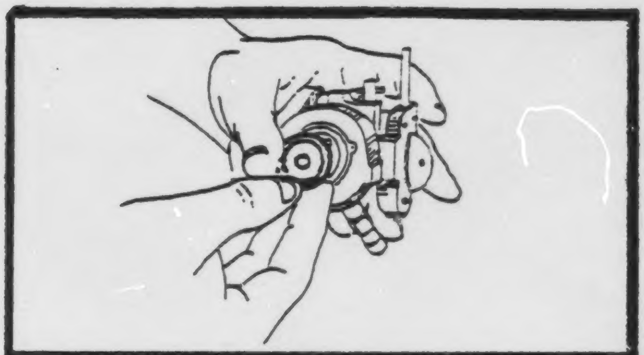
1. REMOVED THE CARBURETOR.
2. REBUILT THE CARBURETOR.
3. DRAINED THE FUEL TANK.

"TURN THE PAGE"

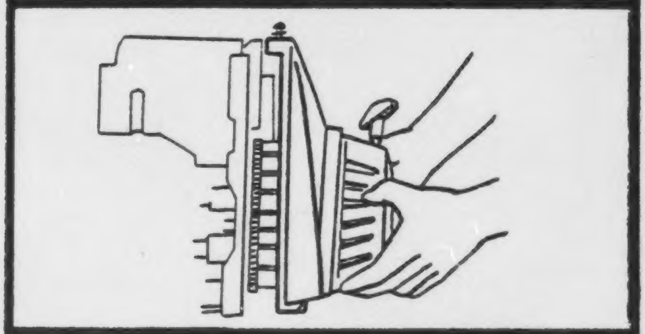
JOB STEPS

READ: LOOK:

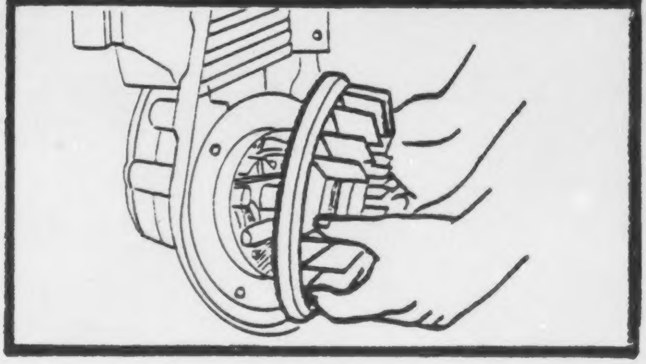
7. CLEAN THE FILTER SCREEN.



8. TAKE THE AIR HOUSING OFF.



9. CAREFULLY TAKE OFF THE FLYWHEEL. BE SURE TO USE THE RIGHT TOOL FOR THIS STEP.



CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

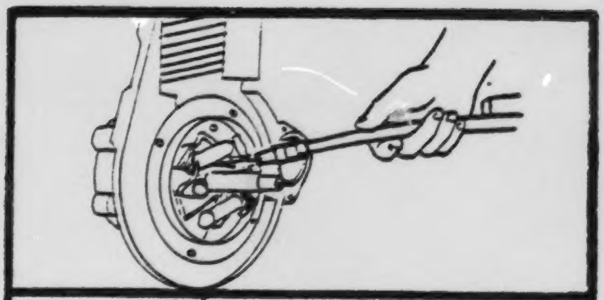
1. CLEANED THE FILTER SCREEN.
2. REMOVED RHE AIR HOUSING.
3. REMOVED THE FLYWHEEL, USING THE RIGHT METHOD.

"TURN THE PAGE"

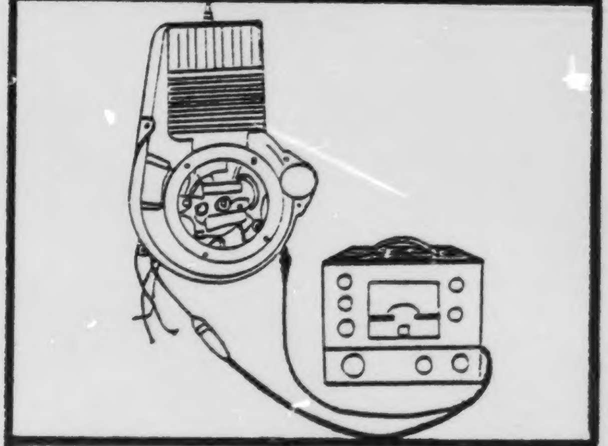
JOB STEPS

READ: LOOK:

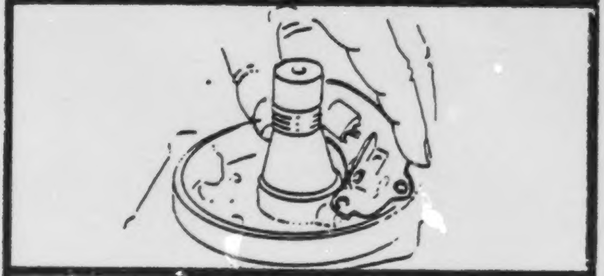
10. USE A CLEANING BRUSH AND GENTLE AIR BLAST TO CLEAN THE MAGENTO AREA.



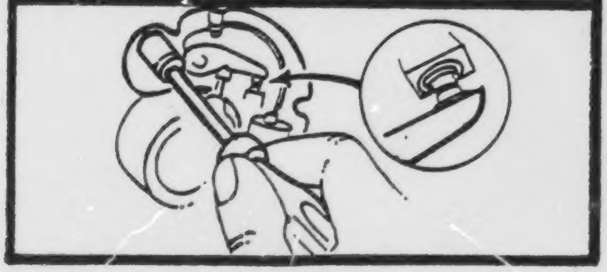
11. USE THE MERCOTRONIC TESTER TO CHECK THE MAGNETO.



12. PUT IN THE NEW POINTS AND CONDENSER.



13. SET THE POINTS TO THE PROPER GAP.



CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

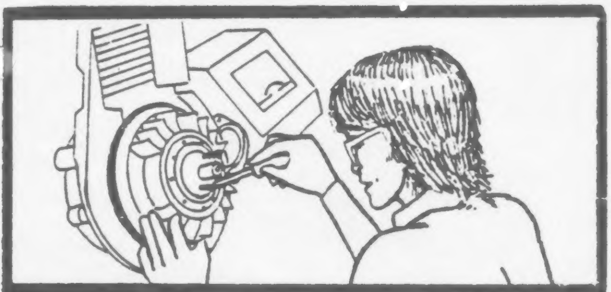
1. CLEANED THE MAGNETO AREA.
2. CHECKED THE MAGNETO.
3. PUT IN A CONDENSER.
4. SET THE POINTS.

TURN THE PAGE

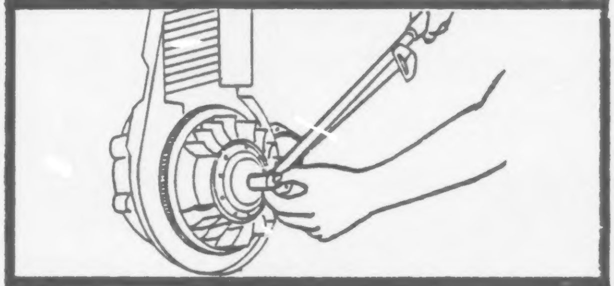
JOB STEPS

READ: LOOK:

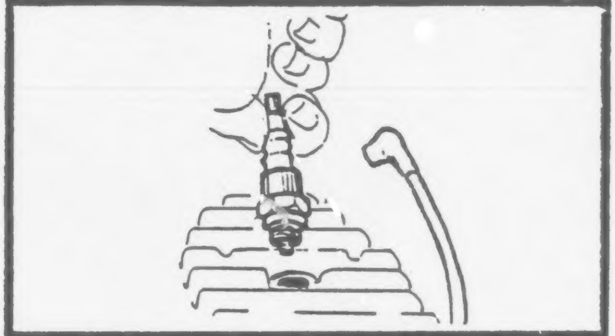
14. TIME THE MAGNETO. →



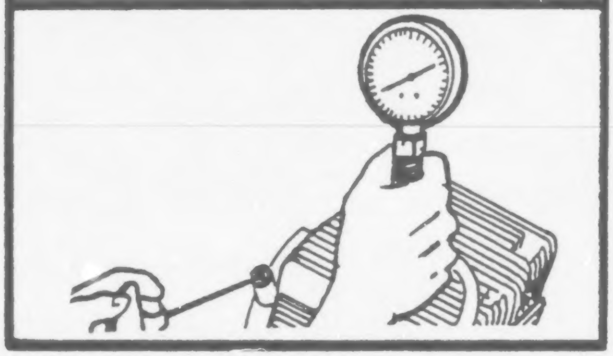
15. PUT ON THE FLYWHEEL. BE SURE TO TORQUE IT DOWN. FIND THE PROPER SPECIFICATIONS IN THE SERVICE MANUAL. →



16. TAKE OUT THE SPARK PLUG. →



17. CHECK THE COMPRESSION. FIND SPECIFICATIONS IN THE SERVICE MANUAL. →



CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

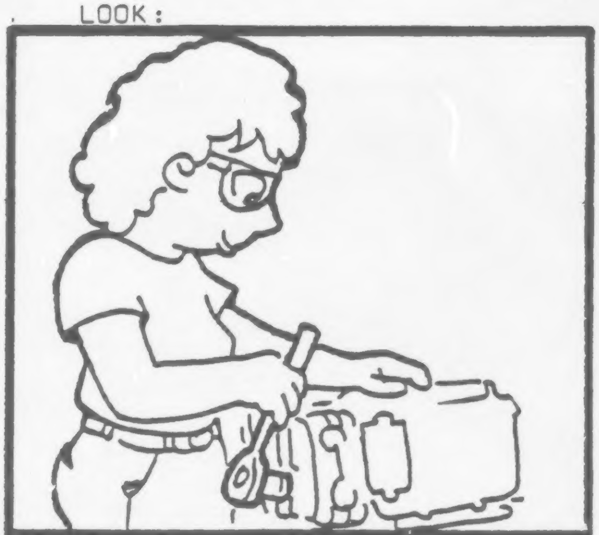
1. TIMED THE MAGNETO.
2. INSTALLED THE FLYWHEEL.
3. DONE A COMPRESSION CHECK.

"TURN THE PAGE"

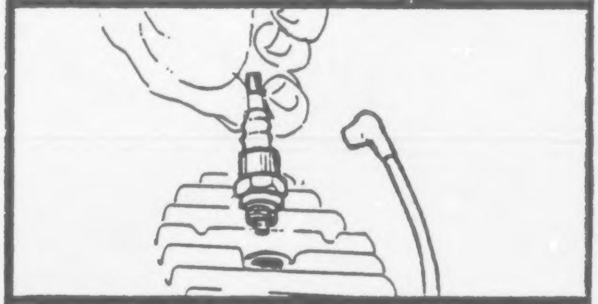
JOB STEPS

READ: LOOK:

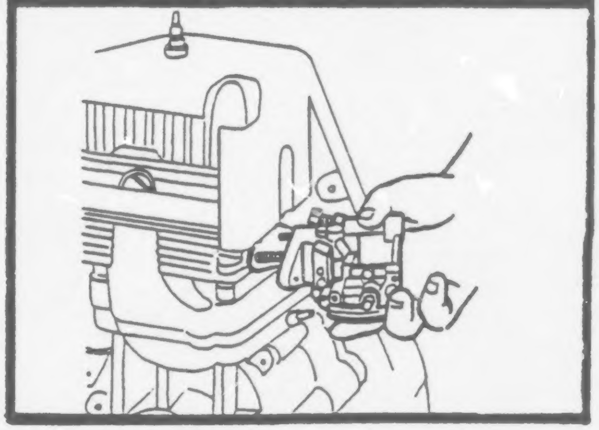
18. USE A TORQUE WRENCH AND SOCKET TO TORQUE THE HEAD BOLTS TO THE RIGHT SPECIFICATIONS. (IN THE SERVICE MANUAL).



19. SET THE GAP ON THE NEW SPARK PLUG. INSTALL THE PLUG.



20. PUT ON THE CARBURETOR.



CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

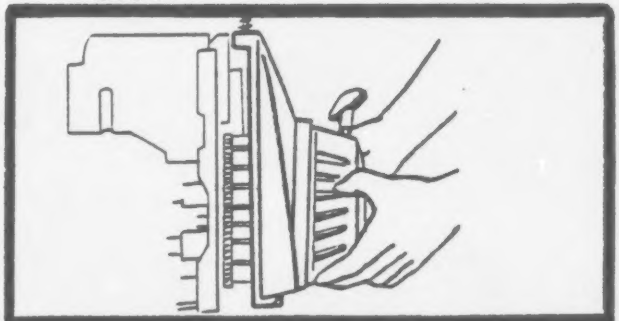
1. TORQUED THE HEAD BOLTS.
2. GAPPED THE PLUG AND INSTALLED IT.
3. PUT THE CARBURETOR ON.

"TURN THE PAGE"

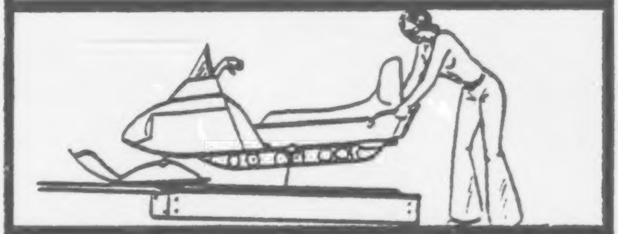
JOB STEPS

READ: LOOK:

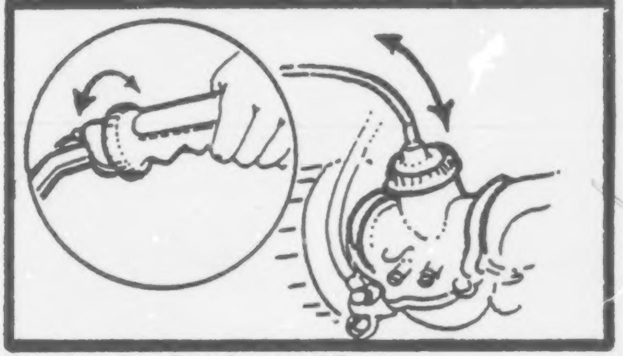
21. PUT ON THE AIR HOUSING.



22. PUT THE SNOWMOBILE ON THE DYNOMETER.



23. CHECK THE THROTTLE CABLE. BE SURE IT CLOSES THE CARBURETOR TO THE IDLE STOP POSITION.



CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

1. PUT THE AIR HOUSING ON.
2. PUT THE SNOWMOBILE ON THE DYNOMETER IN THE RIGHT WAY.
3. CHECKED THE THROTTLE CABLE FOR IDLE STOP.

24. START THE ENGINE. LET IT WARM UP.

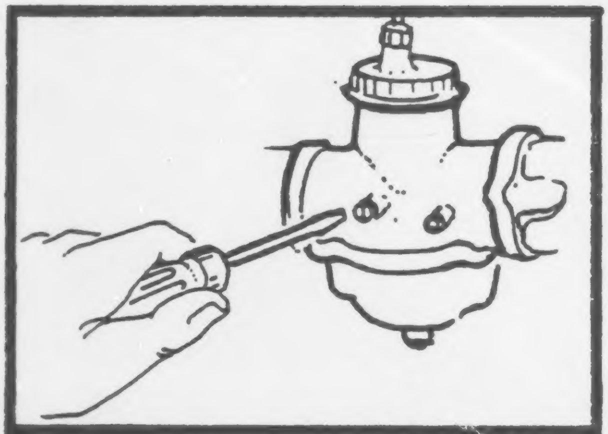
"TURN THE PAGE"

JOB STEPS

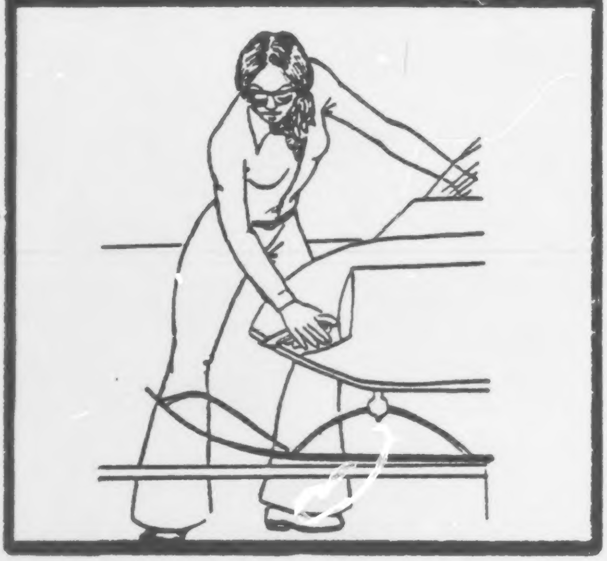
READ: LOOK:

25. ADJUST THE IDLE JET AND THE HIGH SPEED JET.

26. ADJUST THE IDLE SPEED SCREW SO THAT THE TRACK DOES NOT TURN WHEN THE ENGINE IDLES.



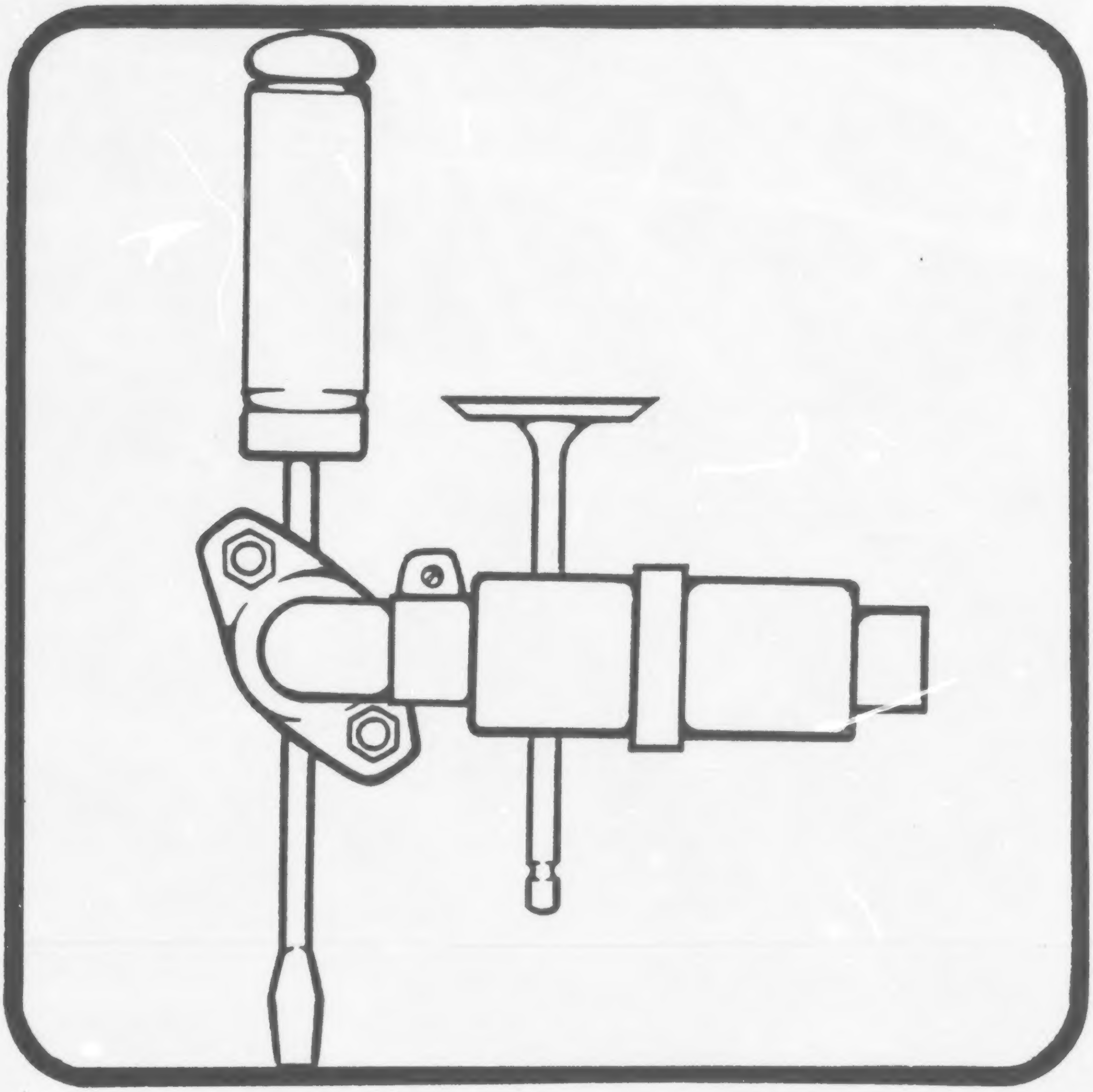
27. CLEAN UP THE SNOWMOBILE FOR THE CUSTOMER.



28. CLEAN UP YOUR WORK AREA.

CHECK: ASK YOU INSTRUCTOR TO CHECK YOUR WORK. YOUR INSTRUCTOR WILL CHECK:

1. THAT YOU HAVE ADJUSTED THE CARBURETOR IN THE RIGHT MAY.
2. CLEANED UP THE SNOWMOBILE.
3. CLEANED UP YOUR WORK AREA.



small engine repair

unit: SHORT BLOCKS

capital area career center

module: 7501 19 001 1
7501 19 001 3 date: DECEMBER 1977 level: IV

skill title: INSTALL A SHORT BLOCK IN A TWO CYCLE ENGINE

developed & written by: JIM PITTS AND DWIGHT SMITH

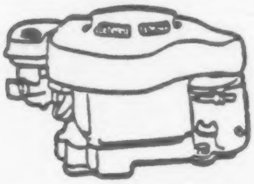
visuals by: DAVE WEHRWEIN & BRUCE BENNETT

PERFORMANCE OBJECTIVE

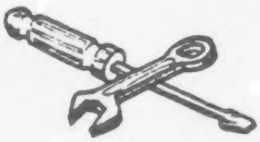
YOU ARE GOING TO LEARN:

HOW TO REMOVE AND INSTALL A SHORT BLOCK IN A 2 CYCLE ENGINE.

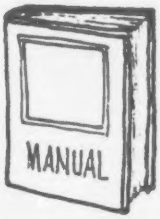
AND IN ORDER TO DO THIS YOU WILL NEED:



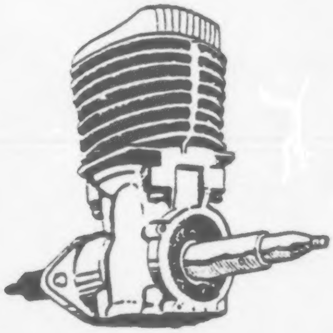
AN ENGINE IN NEED OF A SHORT BLOCK



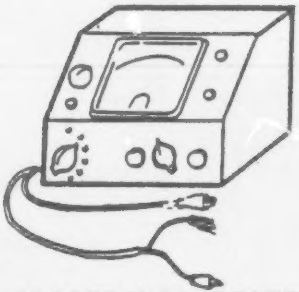
HAND TOOLS



SERVICE MANUAL



SHORT BLOCK



MERCOTRONIC TESTER

SAFETY GLASSES

WE WILL KNOW YOU CAN DO IT WHEN:

1. YOU HAVE GATHERED THE MATERIALS FOR THIS MODULE.
2. YOU HAVE FOLLOWED THE JOB STEPS TO INSTALL A SHORT BLOCK IN A 2 CYCLE ENGINE.
3. THE REBUILT ENGINE STARTS AND RUNS ACCORDING TO THE SERVICE MANUAL SPECIFICATIONS.
4. YOU HAVE RETURNED THE TOOLS TO THE PROPER PLACES AND CLEANED UP THE WORK AREA.

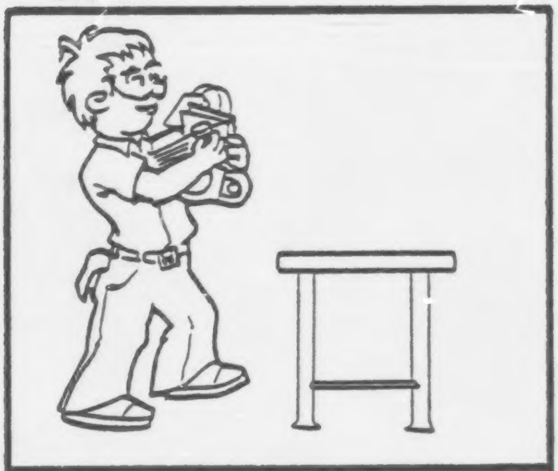
"TURN THE PAGE"

JOB STEPS

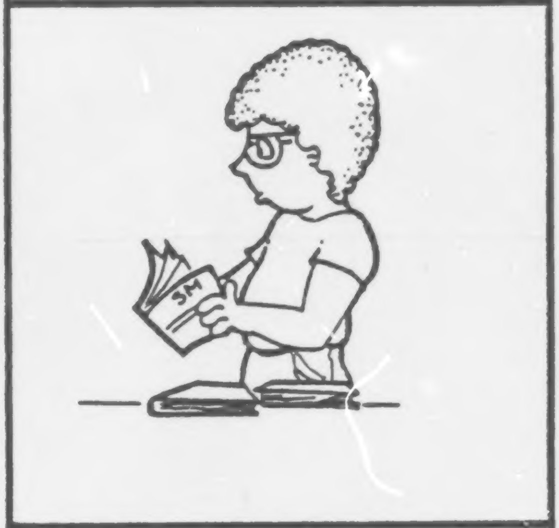
READ:

LOOK:

1. TAKE THE EQUIPMENT AND SUPPLIES LISTED ON PAGE 2 TO YOUR WORK AREA.

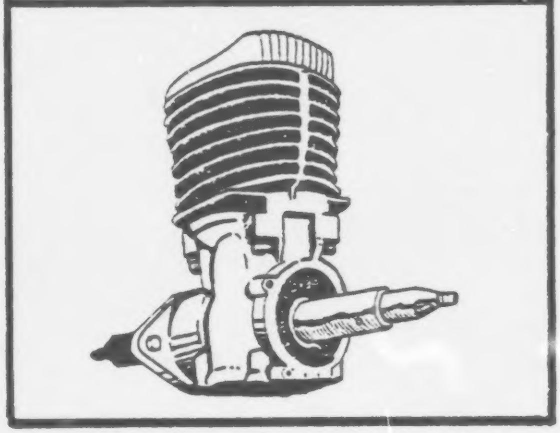


2. CHECK THE ENGINE MODEL AND SERIAL NUMBER WITH THE SERVICE MANUAL AND BE SURE YOU HAVE THE RIGHT MANUAL.



3. PUT ON YOUR SAFETY GLASSES.

4. TAKE THE NEW SHORT BLOCK OUT OF THE BOX. A SHORT BLOCK MEANS A NEW BLOCK THAT HAS PISTONS, RODS, CRANKSHAFT, AND ALL OTHER INSIDE PARTS. THE OUTSIDE PARTS MUST BE TAKEN OFF THE OLD ENGINE AND PUT ON THE NEW ONE. THESE PARTS ARE LIKE THE MUFFLER, THE CARBURETOR, THE STARTER, ETC.



LOOK CAREFULLY AT THE NEW SHORT BLOCK. DOES IT LOOK LIKE THE OLD ONE?

"TURN THE PAGE"

JOB STEPS

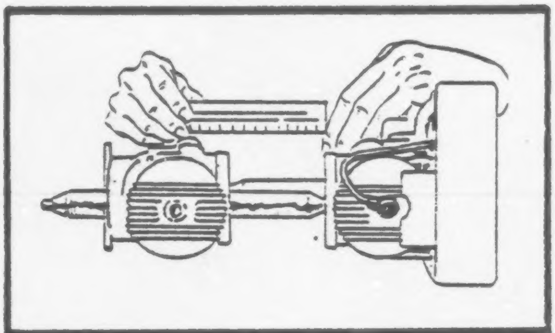
READ: LOOK:

CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

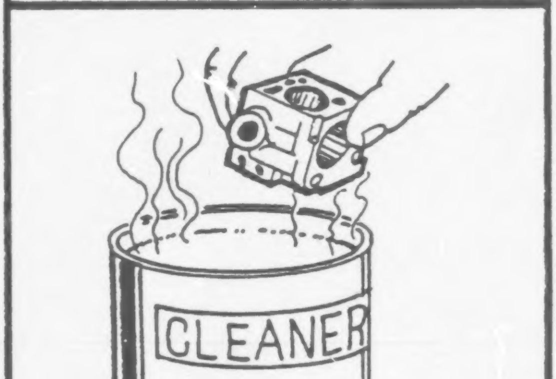
1. ALL THE MATERIALS FOR THIS MODULE.
2. THE RIGHT SERVICE MANUAL.
3. YOUR SAFETY GLASSES ON.
4. THE RIGHT SHORT BLOCK FOR THE ENGINE.

5. IF THE OLD ENGINE YOU ARE WORKING ON IS MOUNTED, REMOVE IT.

6. MEASURE THE LENGTH OF THE OLD AND NEW CRANKSHAFTS. ALSO LOOK AT THE REED PLATE SHAPE. IF THERE ARE ANY DIFFERENCES, TELL YOUR INSTRUCTOR.



7. REMOVE THE CARBURETOR AND TAKE IT APART. PUT IT IN THE CLEANER.

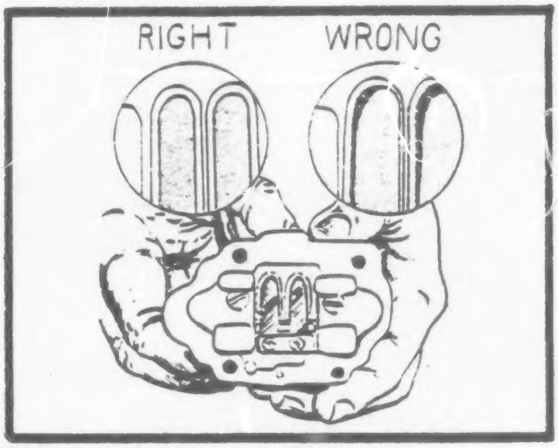


"TURN THE PAGE"

JOB STEPS

READ: LOOK:

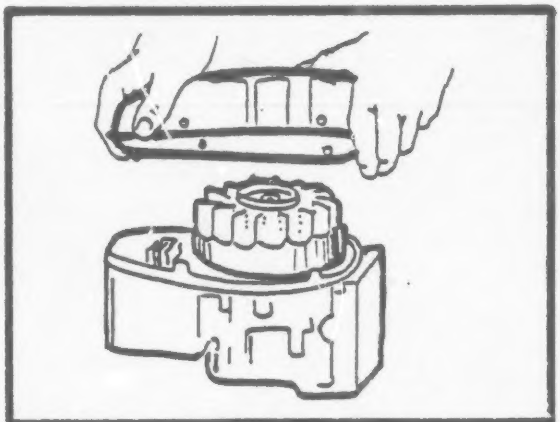
8. CHECK THE REED PLATE FOR PROPER SEALING.



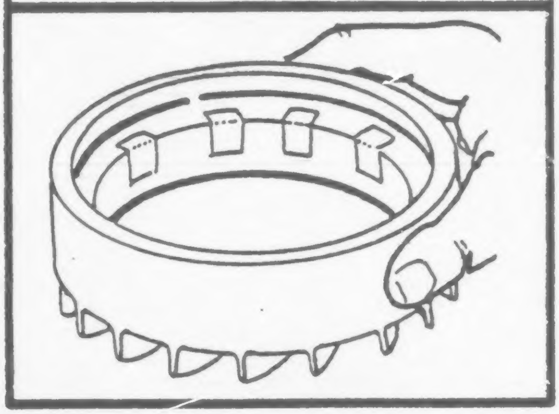
CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

1. REMOVED THE ENGINE.
2. CHECKED THE CRANKSHAFT LENGTH.
3. TAKEN OFF THE CARBURETOR AND CLEANED IT.
4. CHECKED THE REED PLATE.

9. TAKE THE AIR HOUSING OFF.



10. TAKE THE FLYWHEEL OFF. BE SURE TO USE THE RIGHT TOOL AND THE RIGHT WAY TO REMOVE THE KIND OF FLYWHEEL YOU HAVE.

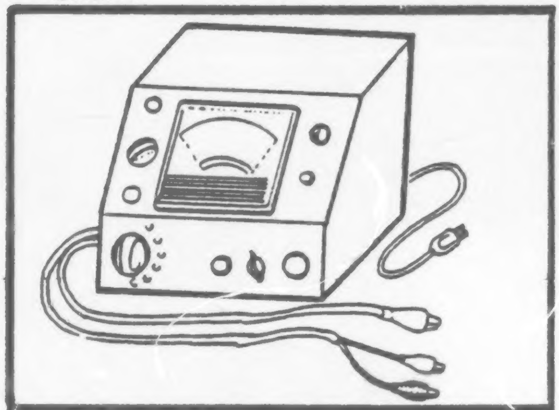


"TURN THE PAGE"

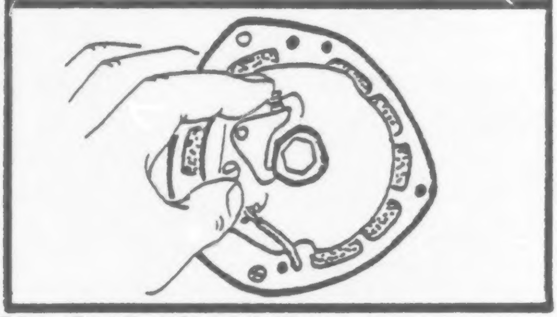
JOB STEPS

READ: LOOK:

11. USE THE MERCOTRONIC TESTER TO CHECK THE COIL AND CONDENSER. →



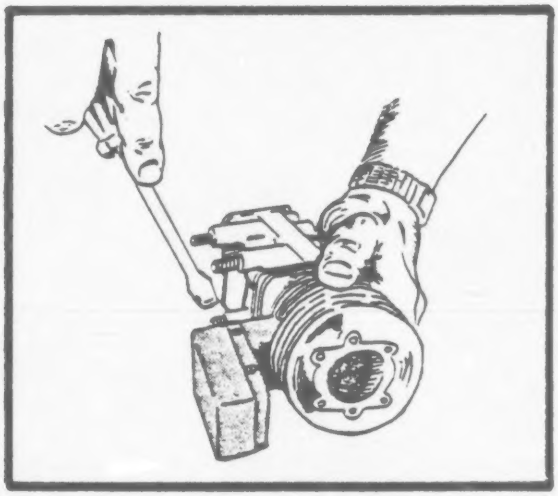
12. REMOVE THE POINTS. →



CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

1. TAKEN THE AIR HOUSING OFF.
2. REMOVED THE FLYWHEEL THE RIGHT WAY.
3. TESTED THE COIL AND CONDENSER.
4. REMOVED THE POINTS.

13. REMOVE THE MUFFLER IF IT IS STILL ON. →



"TURN THE PAGE"

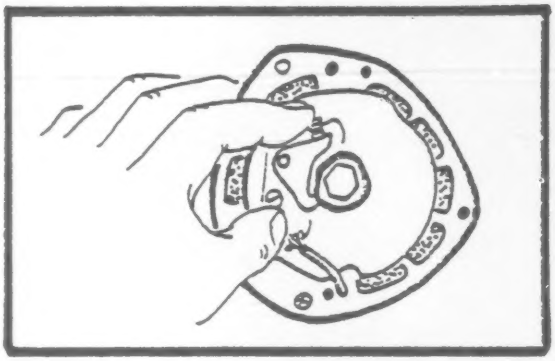
JOB STEPS

READ: LOOK:

14. TAKE OFF ANYTHING STILL ON THE OLD ENGINE THAT IS NOT ON THE NEW SHORT BLOCK.

15. CLEAN ALL THE PARTS THAT GO ON THE NEW ENGINE BLOCK.

16. PUT IN NEW POINTS AND CONDENSER. SET THE POINTS ACCORDING TO SPECIFICATIONS. →



CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

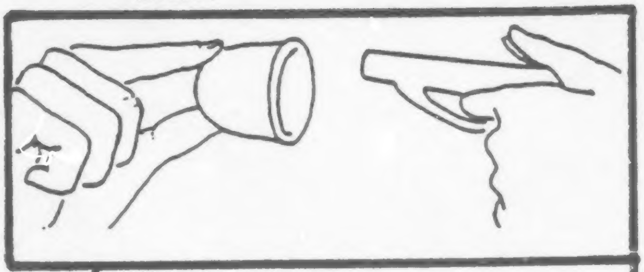
1. REMOVED THE MUFFLER.
2. REMOVED EVERYTHING OF USE OFF THE OLD ENGINE.
3. PUT IN A NEW CONDENSER.
4. SET NEW POINTS.

"TURN THE PAGE"

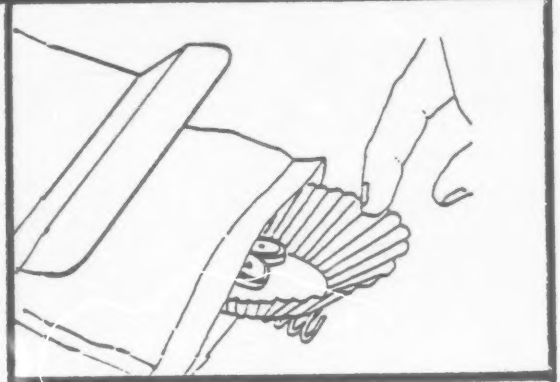
JOB STEPS

READ: LOOK:

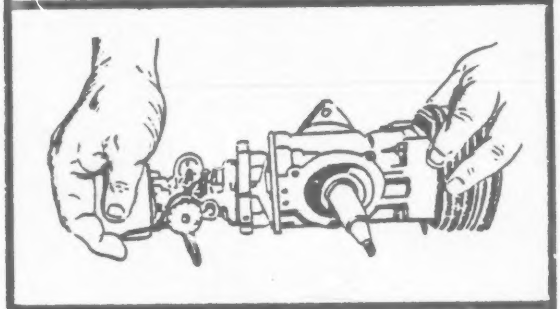
17. TAKE THE CARBURETOR OUT OF THE CLEANER AND BLOW IT OUT WITH COMPRESSED AIR.



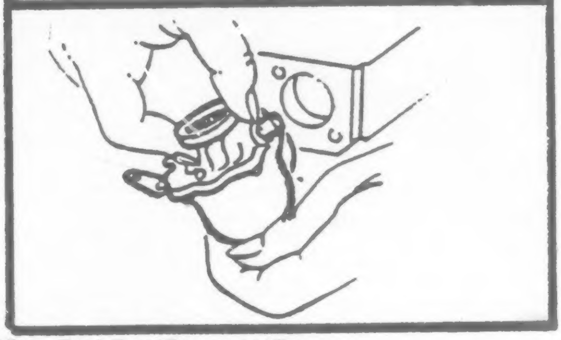
18. USE THE PARTS FROM THE CARBURETOR KIT TO REBUILD THE CARBURETOR.



19. CHECK WHERE THE REED PLATE BOLTS TO THE ENGINE OR CARBURETOR AND PUT IT ON.



20. PUT THE CARBURETOR ON THE ENGINE AND HOOK UP THE GOVERNOR.



CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

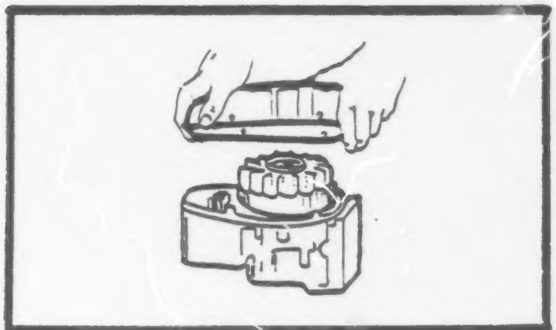
1. CLEANED OUT THE CARBURETOR BODY AND REBUILT IT.
2. PUT THE REED PLATE ON.
3. PUT THE CARBURETOR ON THE ENGINE.

"TURN THE PAGE"

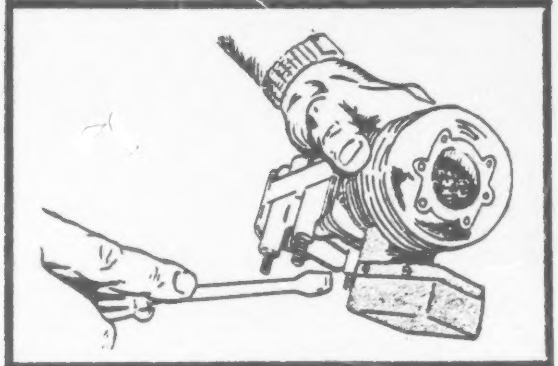
JOB STEPS

READ: LOOK:

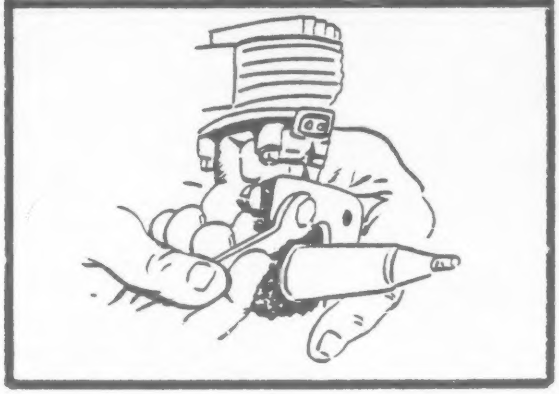
21. PUT ON THE AIR HOUSING AND STARTER ASSEMBLY.



22. PUT THE MUFFLER ON. BE SURE YOU KNOW IF IT GOES ON BEFORE OR AFTER THE ENGINE COVER.



23. BOLT THE ENGINE TO ITS MOUNTS.



24. BE SURE THE BLADE OR CHAIN DRIVE IS TIGHT.

CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

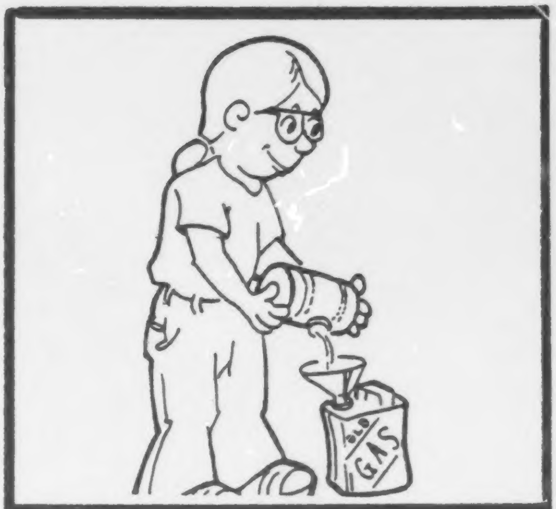
1. PUT ON THE AIR HOUSING.
2. PUT ON THE MUFFLER.
3. TIGHTENED THE ENGINE TO ITS MOUNTS.
4. TIGHTENED THE BLADE OR DRIVE.

"TURN THE PAGE"

JOB STEPS

READ: LOOK:

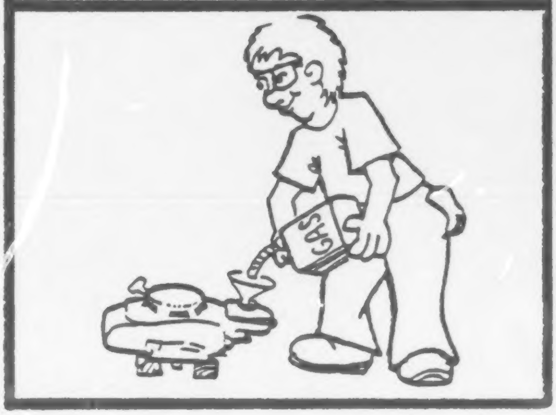
25. REMOVE AND CLEAN THE FUEL TANK, FUEL FILTER AND LINE.



26. PUT FRESH GAS/OIL MIXTURE IN THE TANK. BE SURE TO USE THE RIGHT MIXTURE. FILL IT 1/4 FULL.

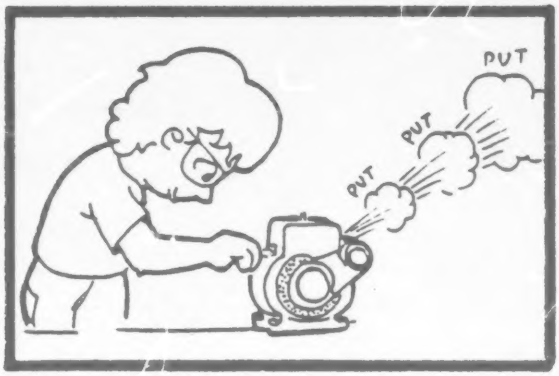
CHECK MIXTURE: IS IT. . .
1/2 PINT TO 1 GALLON?
1/4 PINT TO 1 GALLON?
1 QUART TO 5 GALLONS?

ASK YOUR INSTRUCTOR IF YOU ARE NOT SURE.



27. START THE ENGINE AND LET IT WARM UP.

28. ADJUST THE CARBURETOR AND THROTTLE CABLE.



CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

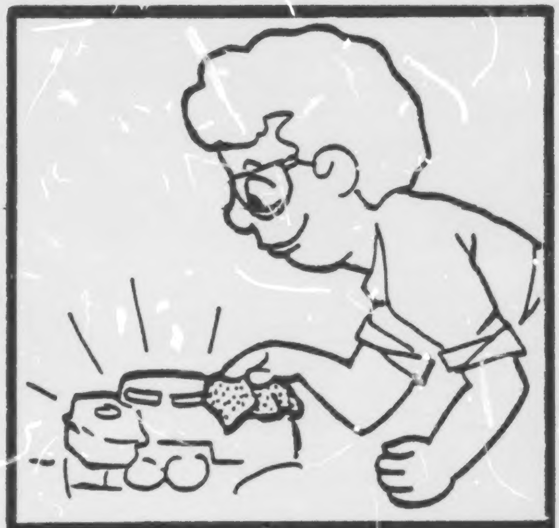
1. CLEANED THE FUEL SYSTEM.
2. PUT FRESH FUEL IN THE TANK.
3. START THE ENGINE.
4. ADJUSTED THE CARBURETOR.

"TURN THE PAGE"

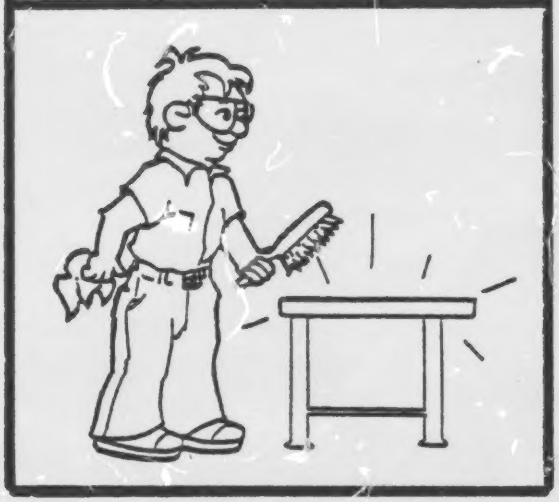
JOB STEPS

READ: LOOK:

29. CLEAN UP THE MACHINE FOR THE CUSTOMER.

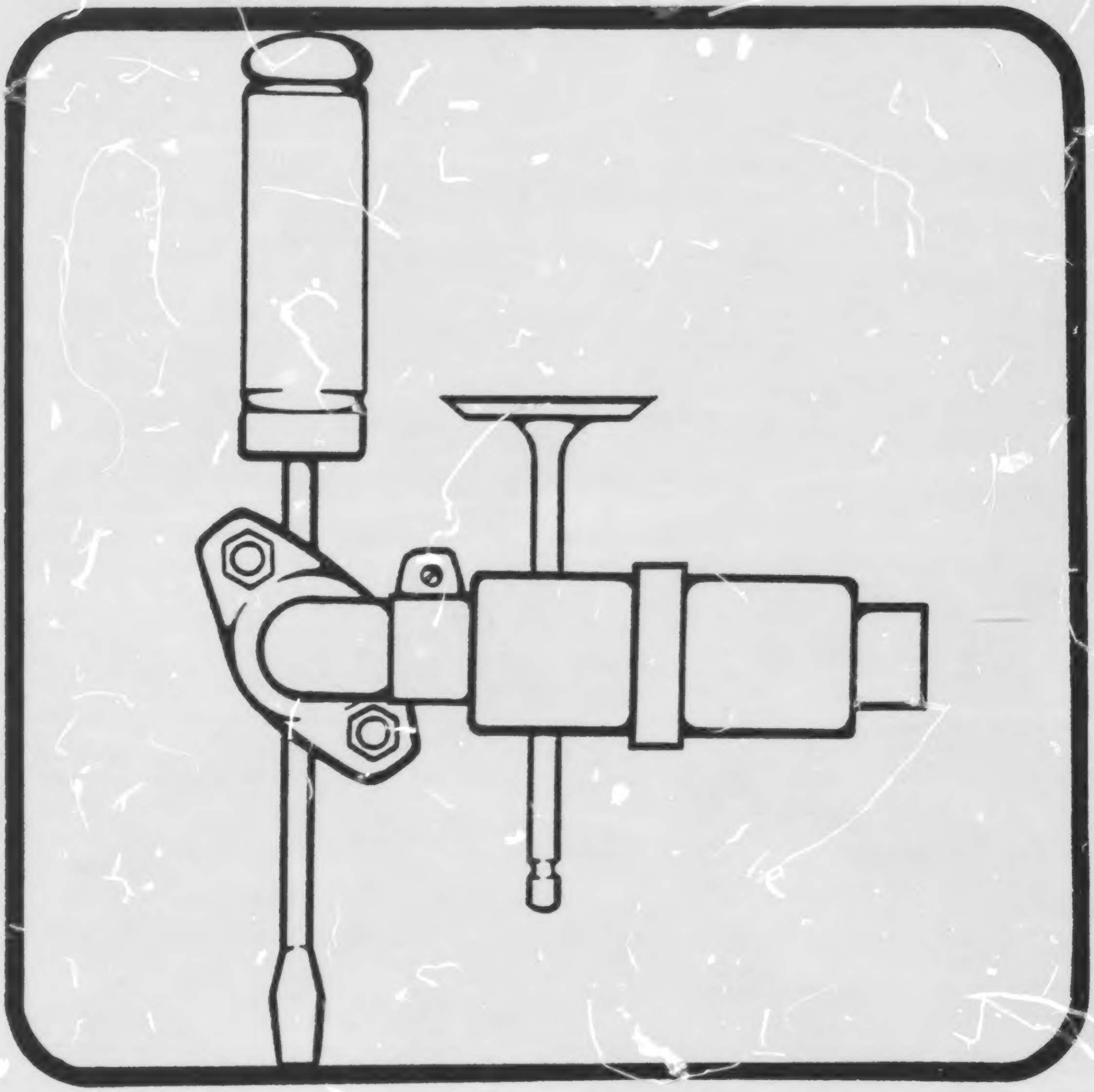


30. CLEAN UP THE WORK AREA AND PUT AWAY ALL THE TOOLS.



CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

1. CLEANED UP THE ENGINE.
2. CLEANED UP YOUR WORK AREA.



small engine repair

unit: SHORT BLOCKS

capital area career center

module: 7501 19 002 1
7501 19 002 3
date: SEPTEMBER 1977
level: IV

skill title: INSTALL A SHORT BLOCK IN A FOUR CYCLE ENGINE

developed & written by: JIM PITTS AND DWIGHT SMITH

visuals by: DAVE WEHRWEIN & BRUCE BENNETT

WORD GUIDE

REMOVE - TAKE OFF

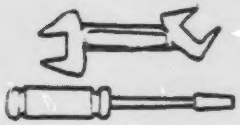
REPLACE - CHANGE OR PUT BACK

PERFORMANCE OBJECTIVE

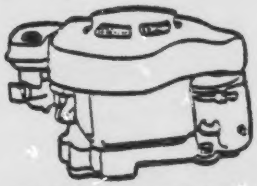
YOU ARE GOING TO LEARN:

HOW TO PUT IN A SHORT BLOCK IN A FOUR-CYCLE ENGINE.

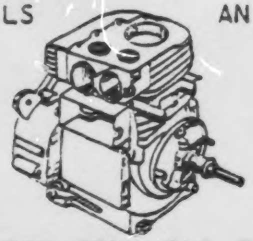
AND IN ORDER TO DO THIS YOU WILL NEED:



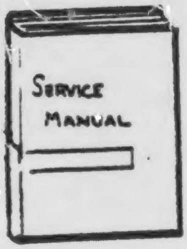
HAND TOOLS



AN ENGINE (FOUR CYCLE)



SHORT BLOCK FOR YOUR ENGINE



SERVICE MANUAL

MODS YOU HAVE DONE BEFORE: 7501 01 003, 7501 01 021, 7501 03 001, 7501 05 000, 7501 08 000, 7501 15 000.

WE WILL KNOW YOU CAN DO IT WHEN:

1. YOU HAVE REMOVED AND REPLACED A SHORT BLOCK ON A FOUR-CYCLE ENGINE SO IT RUNS SMOOTHLY.
2. YOU HAVE CLEANED UP THE WORK AREA AND PUT BACK ALL TOOLS.

"TURN THE PAGE"

WORD GUIDE

"CRANKLESS" - WITHOUT A CRANK

COMPARE - LOOK AT BOTH TO SEE IF THEY ARE THE SAME IN EVERY WAY

JOB STEPS

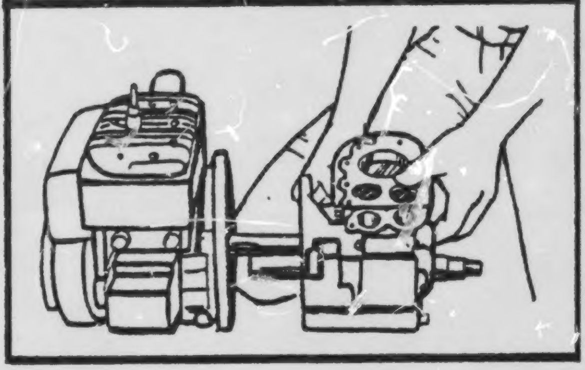
READ:

LOOK:

1. TAKE ALL EQUIPMENT TO YOUR WORK AREA.

2. STUDY THE NEW SHORT BLOCK. IS THE CRANK PUT IN? IF NOT, IT IS A "CRANKLESS" SHORT BLOCK. GO ON TO JOB STEP #4.

3. NOW COMPARE THE SHORT BLOCK WITH YOUR ENGINE'S BLOCK TO BE SURE IT IS THE RIGHT ONE. USE ANOTHER SHEET OF PAPER TO ANSWER. DO NOT WRITE IN THIS MOD.



A. ARE THE CRANKSHAFT PTO ENDS THE SAME?

B. ARE THE FLYWHEEL ENDS THE SAME?

C. IS THE EXHAUST HOLE IN THE SIDE OR BOTTOM?

D. ARE THE EXHAUST VALVES IN THE TOP OR BOTTOM?

E. ARE THE OIL FILL HOLES IN THE SAME PLACE?

F. ARE THE HEAD BOLTS IN THE SAME PLACES ON THE TWO BLOCKS?

WHEN YOU HAVE CHECKED THE BLOCK AND KNOW IT IS THE SAME, GO ON TO JOB STEP #4.

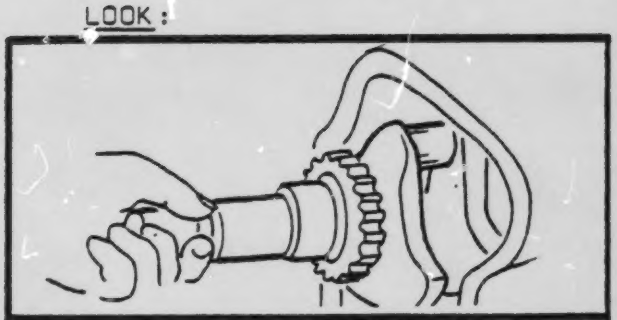
CHECK: ASK YOUR INSTRUCTOR TO CHECK THE BLOCK WITH YOU.

"TURN THE PAGE"

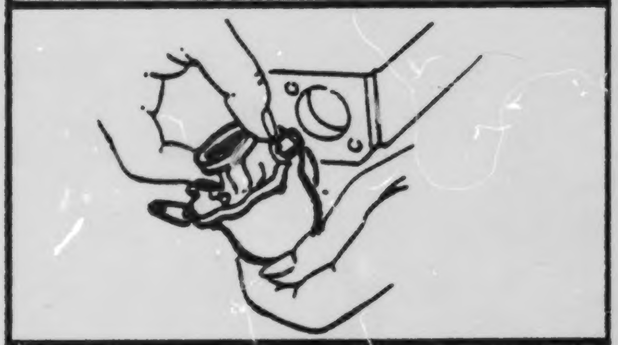
JOB STEPS

READ: LOOK:

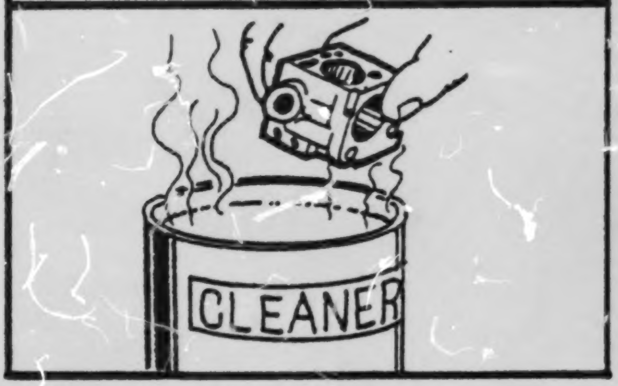
4. IF YOU HAVE A TECUMSEH "CRANKLESS" SHORT BLOCK, PUT IN THE CRANKSHAFT, LIKE YOU DID IN MOD 7501 01 021.



5. USE THE RIGHT TOOLS AND REMOVE THE CARBURETOR AND MANIFOLD.



6. TAKE APART THE CARBURETOR AND PUT IT IN THE CARBURETOR CLEANER. USE THE MOD FROM UNIT 5.



CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

1. STUDIED THE NEW SHORT BLOCK.
2. COMPARED THE OLD ONE AND NEW ONE.
3. PUT IN CRANKSHAFT.
4. REMOVED CARBURETOR AND MANIFOLD.
5. TAKEN APART CARBURETOR AND PUT IT IN CARBURETOR CLEANER.

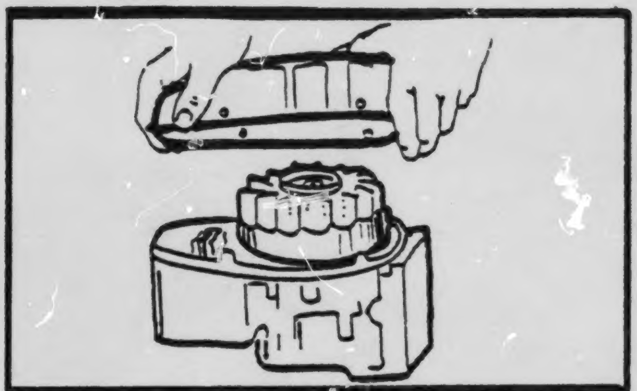
7. TAKE THE ENGINE OFF ITS MOUNTS (IF IT IS MOUNTED). USE UNIT 15 MODS IF YOU HAVE QUESTIONS.

"TURN THE PAGE"

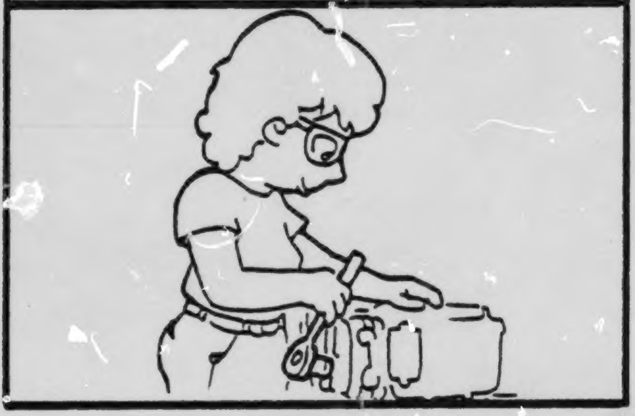
JOB STEPS

READ: LOOK:

8. TAKE OFF THE AIR HOUSING AND FLYWHEEL.



9. WITH CARE, REMOVE THE MAGNETO AND HEAD.

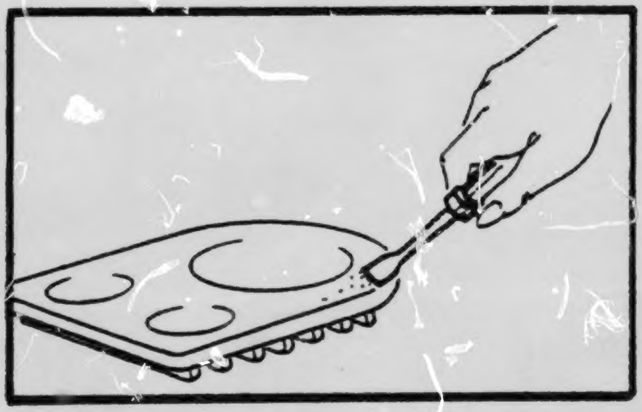


CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

1. REMOVED THE ENGINE FROM ITS MOUNTS.
2. REMOVED THE AIR HOUSING, FLYWHEEL, AND MAGNETO AND HEAD.

10. CLEAN UP ALL PARTS THAT YOU WILL REMOVE.

11. SCRAPE ALL THE CARBON OFF THE HEAD.



"TURN THE PAGE"

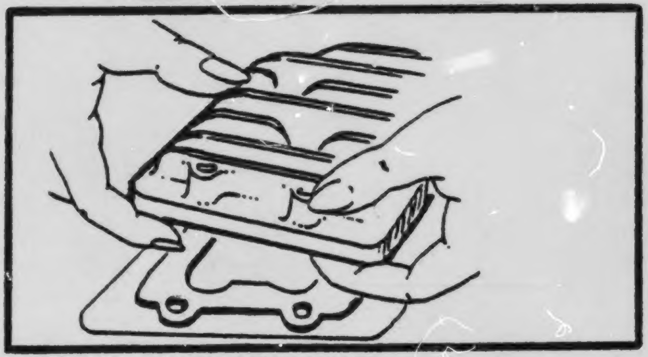
JOB STEPS

READ:

LOOK:

12. IF THE ENGINE IS A BRIGGS AND STRATTON, PUT IN THE HEAD. →

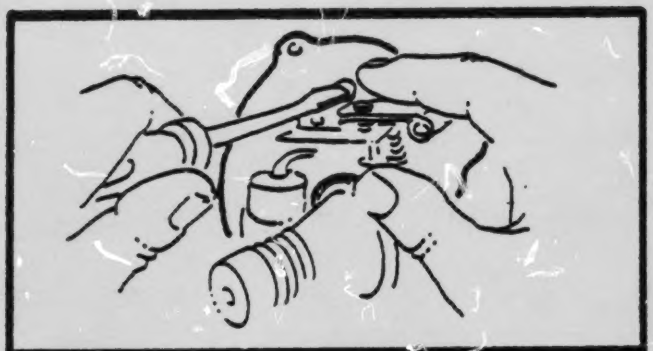
NOTE: FOR TECUMSEH ENGINES, YOU MUST PUT IN AND TIME THE MAGNETO BEFORE YOU PUT ON THE HEAD.



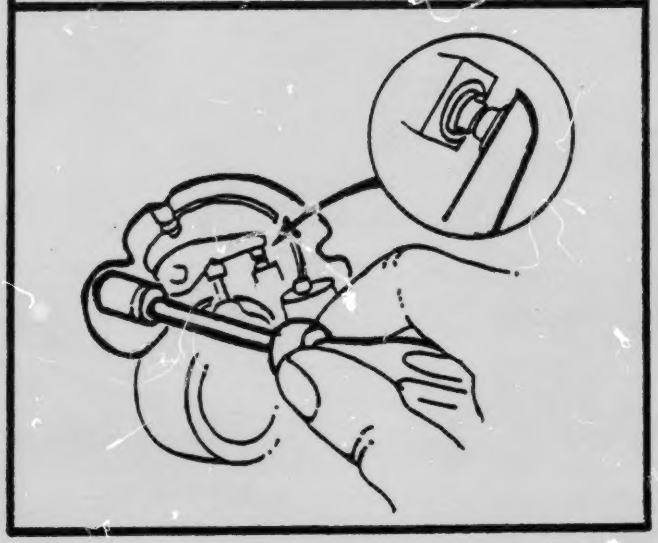
CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

1. CLEANED UP ALL THE RIGHT PARTS.
2. CLEANED THE CARBON OFF THE HEAD.
3. PUT IN THE HEAD ON BRIGGS AND STRATTON ENGINE.

13. FOR TECUMSEH ENGINE, PUT IN AND TIME THE MAGNETO. →



14. FOR BRIGGS AND STRATTON ENGINES, PUT IN NEW POINTS AND CONDENSER. IF YOU HAVE ANY QUESTIONS, SEE UNIT 8 MODS. →

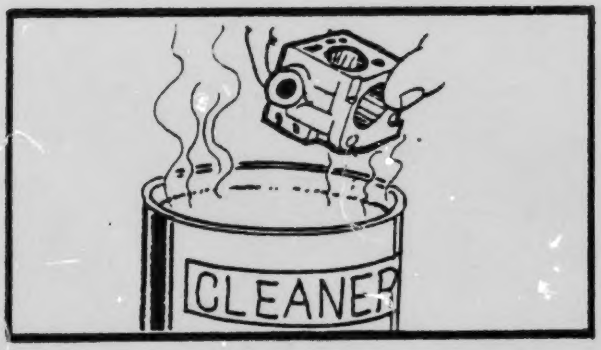


"TURN THE PAGE"

JOB STEPS

READ: LOOK:

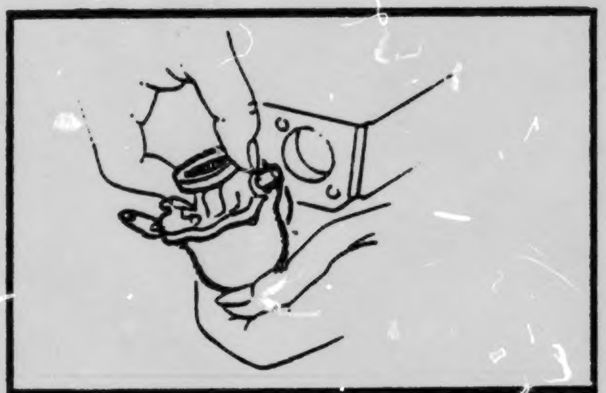
15. TAKE THE CARBURETOR OUT OF THE CLEANER AND REBUILD IT. CHECK UNIT 5 MODS. →



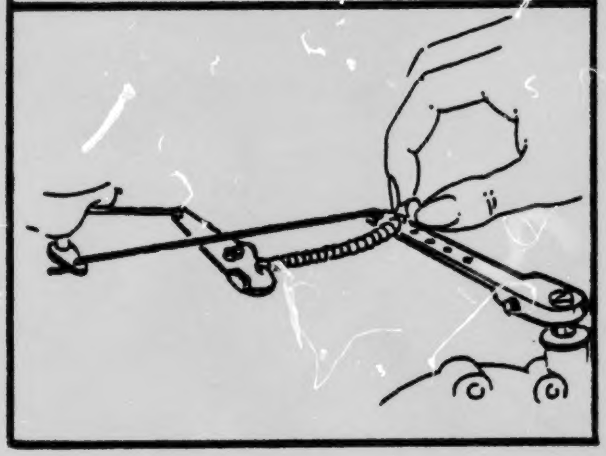
CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

1. PUT IN AND TIMED THE MAGNETO ON TECUMSEH ENGINES.
2. PUT ON THE HEAD FOR BRIGGS & STRATTON ENGINES.
3. REBUILT THE CARBURETOR RIGHT.

16. PUT THE CARBURETOR AND MANIFOLD ON THE NEW ENGINE BLOCK. →



17. SET GOVERNOR IF NEEDED. IF EQUIPPED WITH AIR VANE, CHECK THAT IT WORKS FREELY. SEE MOD 7501 05 C06. →

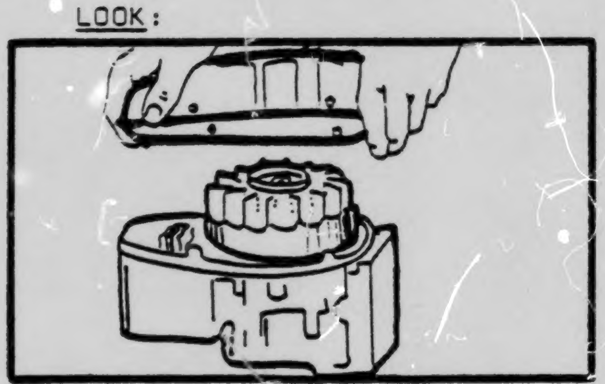


"TURN THE PAGE"

JOB STEPS

READ: LOOK:

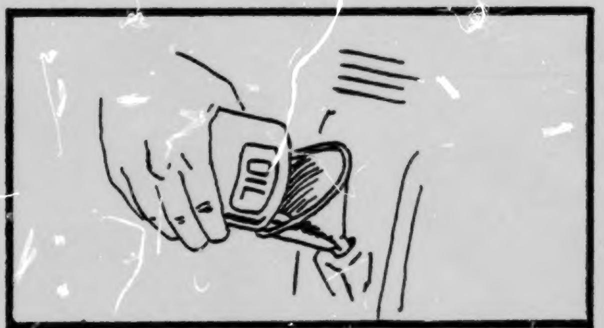
18. PUT IN FLYWHEEL, AIR HOUSING AND STARTER. CHECK MOD 7501 03 001 IF YOU HAVE ANY QUESTIONS. →



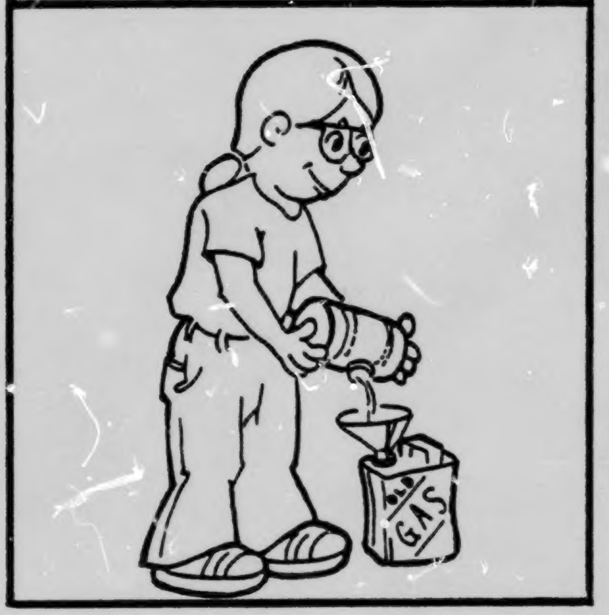
CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

1. PUT IN THE CARBURETOR AND MANIFOLD RIGHT.
2. SET GOVERNOR.
3. PUT IN FLYWHEEL, AIR HOUSING AND STARTER.

19. FILL CRANKCASE WITH RIGHT (SUMMER OR WINTER) OIL. →



20. CHECK THE GAS TANK BEFORE TURNING ON ENGINE. IF TANK IS DIRTY, REMOVE IT AND CLEAN IT, LIKE IN MOD 7501 05 006. →



"TURN THE PAGE"

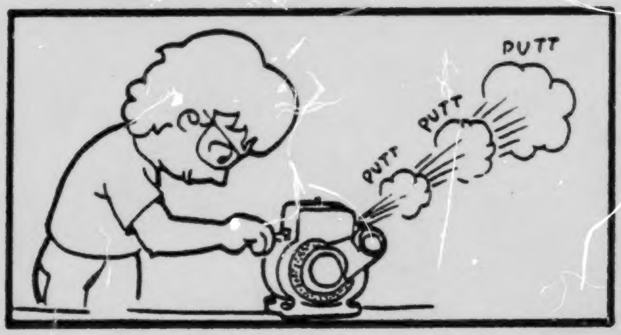
WORD GUIDE

CUSTOMER - PERSON FOR WHOM YOU DO THE JOB

JOB STEPS

READ: LOOK:

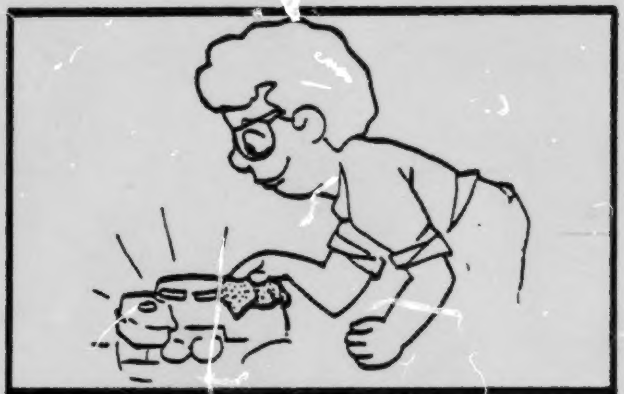
21. START THE ENGINE AND SET THE GOVERNOR RIGHT.



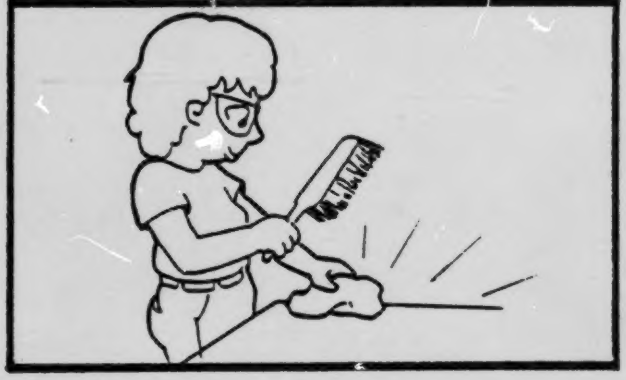
CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

1. FILLED THE CRANKCASE WITH THE RIGHT OIL.
2. CHECKED (AND CLEANED IF NEEDED) THE GAS TANK.
3. STARTED THE ENGINE AND SET THE GOVERNOR.

22. STOP THE ENGINE AND CLEAN IT UP FOR CUSTOMER PICK-UP.

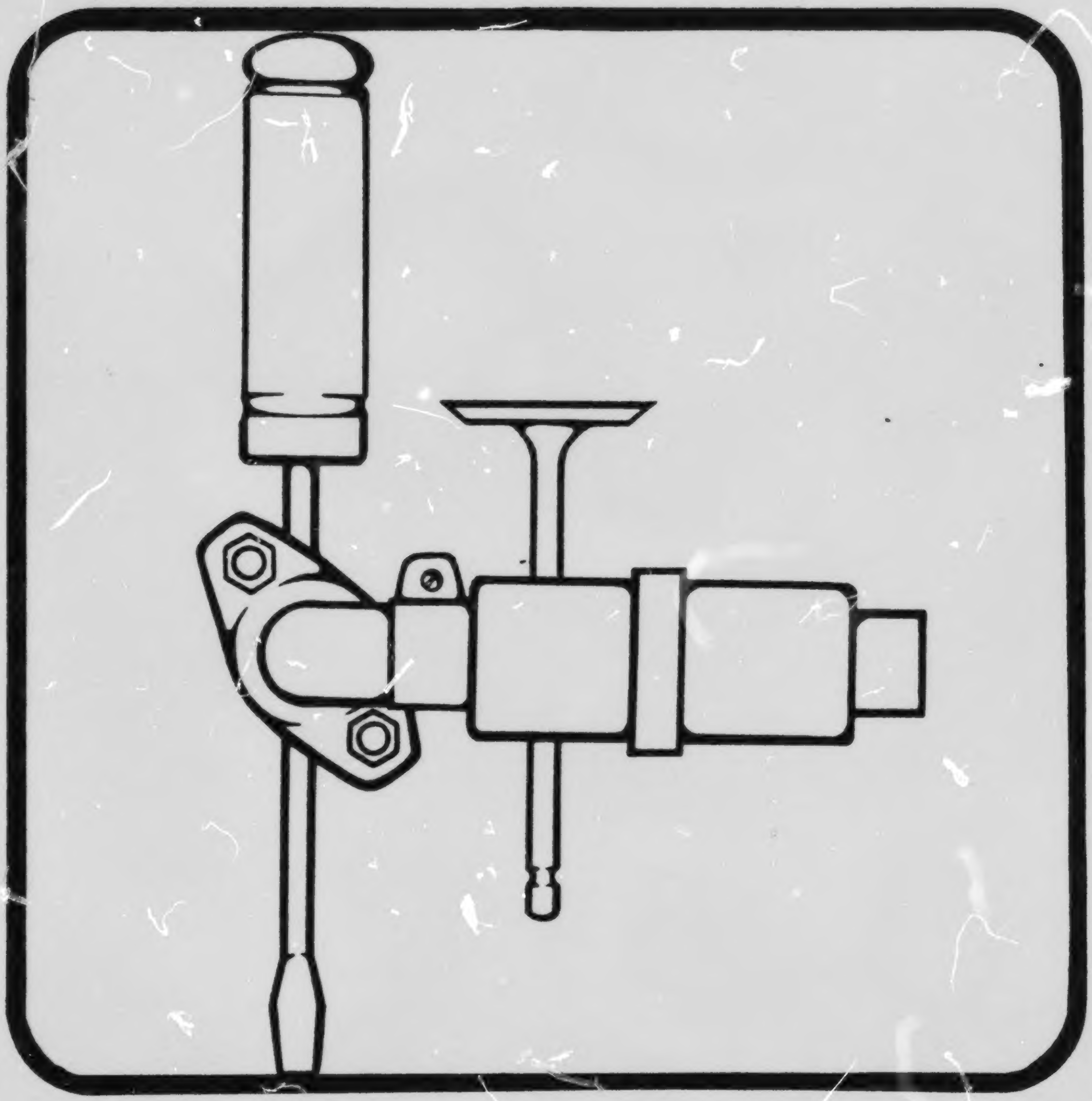


23. CLEAN UP THE WORK AREA AND PUT AWAY ALL THE TOOLS AND EQUIPMENT.



CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

1. CLEANED UP THE ENGINE.
2. CLEANED UP THE WORK AREA AND PUT EVERYTHING AWAY RIGHT.



small engine repair

unit: STORAGE

capital area career center

module: 7501 21 001 1
7501 21 001 3 date: MAY 1978 level: I

skill title: PREPARING A MOWER FOR WINTER STORAGE

developed & written by: JACK HELDER

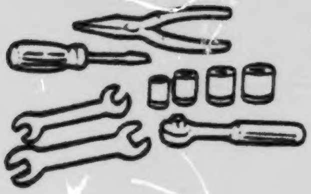
visuals by: DAVE WEHRWEIN

PERFORMANCE OBJECTIVE

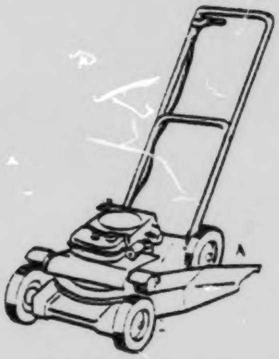
YOU ARE GOING TO LEARN:

HOW TO PREPARE A LAWNMOWER FOR STORAGE.

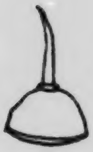
AND IN ORDER TO DO THIS YOU WILL NEED:



HAND TOOLS



A LAWNMOWER THAT RUNS



OIL CAN

WE WILL KNOW YOU CAN DO IT WHEN:

1. YOU HAVE GATHERED ALL EQUIPMENT.
2. YOU HAVE DRAINED GAS FROM TANK AND LINES.
3. YOU HAVE OILED THE PISTON HEAD.
4. YOU HAVE MADE SURE THE EXHAUST VALVE IS CLOSED.

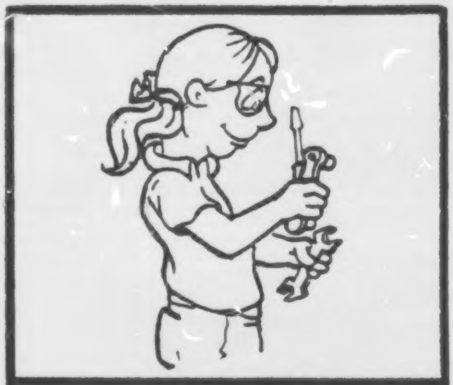
"TURN THE PAGE"

JOB STEPS

READ:

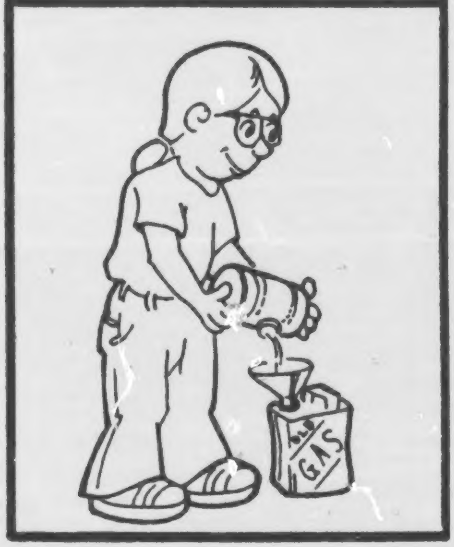
LOOK:

1. TAKE ALL EQUIPMENT TO YOUR WORK AREA.



2. DRAIN GAS FROM TANK:

A. IF YOU CAN, REMOVE TANK AND EMPTY IT INTO A SAFE GAS CAN. THEN REPLACE TANK.



B. OR, DRAIN GAS LINE INTO A SAFE GAS CAN.

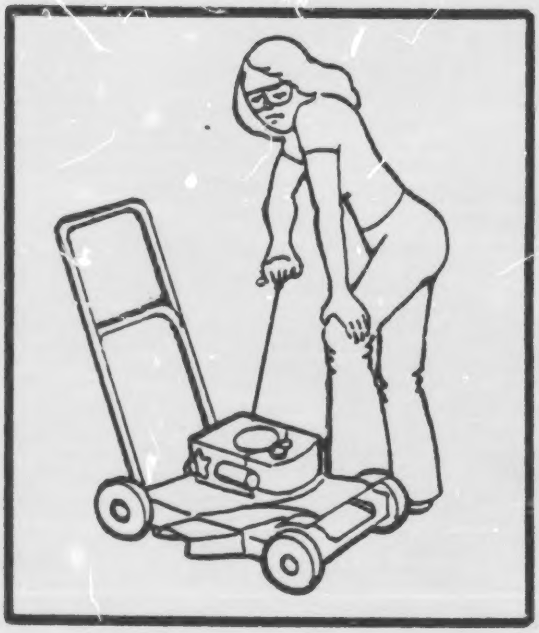
C. OR, SYPHON OUT GAS INTO A SAFE GAS CAN.

"TURN THE PAGE"

JOB STEPS

READ: LOOK:

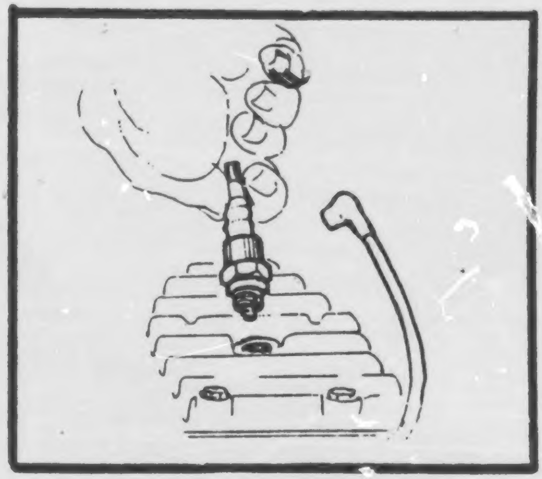
3. START THE ENGINE AND LET IT RUN UNTIL IT STOPS.



4. PUT CHOKE ON AND KEEP TRYING TO START UNTIL IT WILL NOT START.

CHECK: HAVE YOUR INSTRUCTOR CHECK THAT YOU HAVE DRAINED ALL THE GAS.

5. REMOVE THE SPARK PLUG AND SQUIRT OIL IN THE SPARKPLUG HOLE.



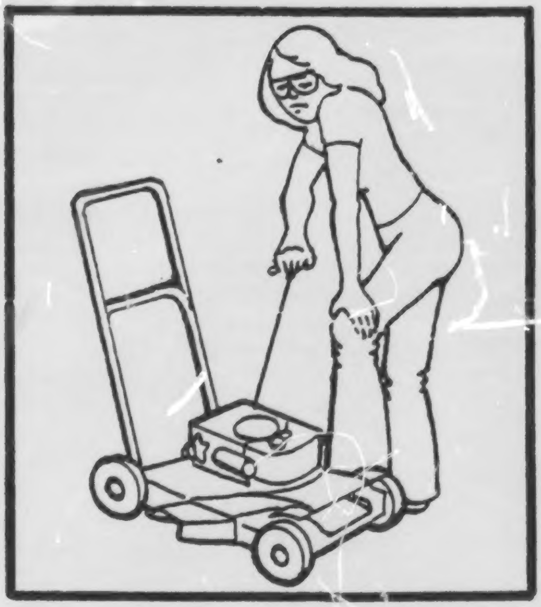
"TURN THE PAGE"

JOB STEPS

READ:

LOOK:

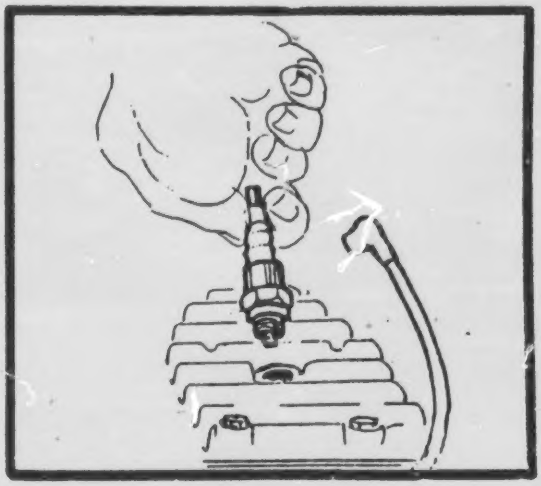
6. TURN OVER THE STARTER. THIS WILL SPREAD OIL OVER THE PISTON HEAD. ➔



CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE PUT OIL ON THE PISTON HEAD.

FOR ROPE PULL STARTERS:

7. REPLACE THE SPARK PLUG. DO NOT CONNECT THE SPARK PLUG WIRE. ➔



8. ROTATE ENGINE UNTIL IT COMES UP ON THE COMPRESSION STROKE.

CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

1. REPLACED THE SPARK PLUG BUT NOT THE SPARK PLUG WIRE.
2. ROTATED THE ENGINE UNTIL IT COMES UP ON THE COMPRESSION STROKE.

"TURN THE PAGE"

JOB STEPS

READ: LOOK:

FOR ELECTRIC START OR RATCHET START MOWERS:

7. PUT FINGER OVER THE SPARK PLUG HOLE.

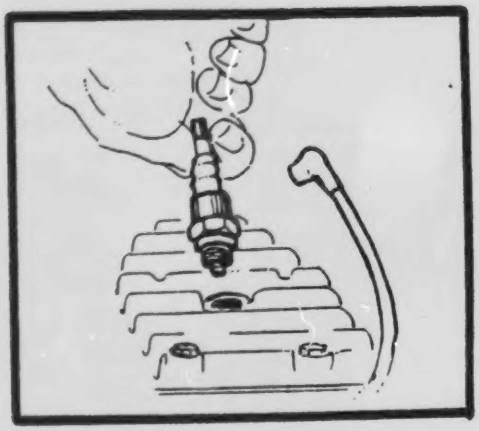
> CAUTION: BE SURE RATCHET TYPE STARTERS ARE NOT WOUND UP.

8. REACH UNDER MOWER. BE CAREFUL: BLADES MAY BE SHARP. TURN BLADE UNTIL YOU FEEL COMPRESSION PUSH ON FINGER IN SPARK PLUG HOLE.

CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

1. PUT THE ENGINE ON THE COMPRESSION STROKE.

9. REPLACE SPARK PLUG. DO NOT CONNECT SPARK PLUG WIRE.



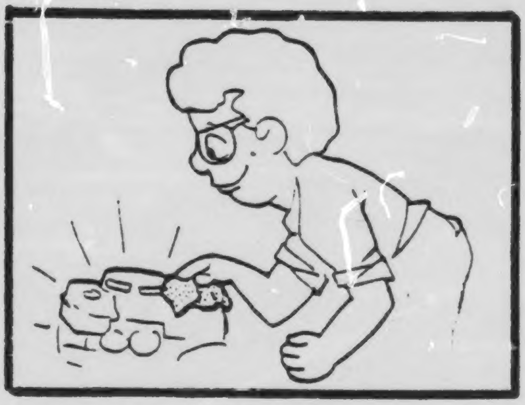
"TURN THE PAGE"

JOB STEPS

READ:

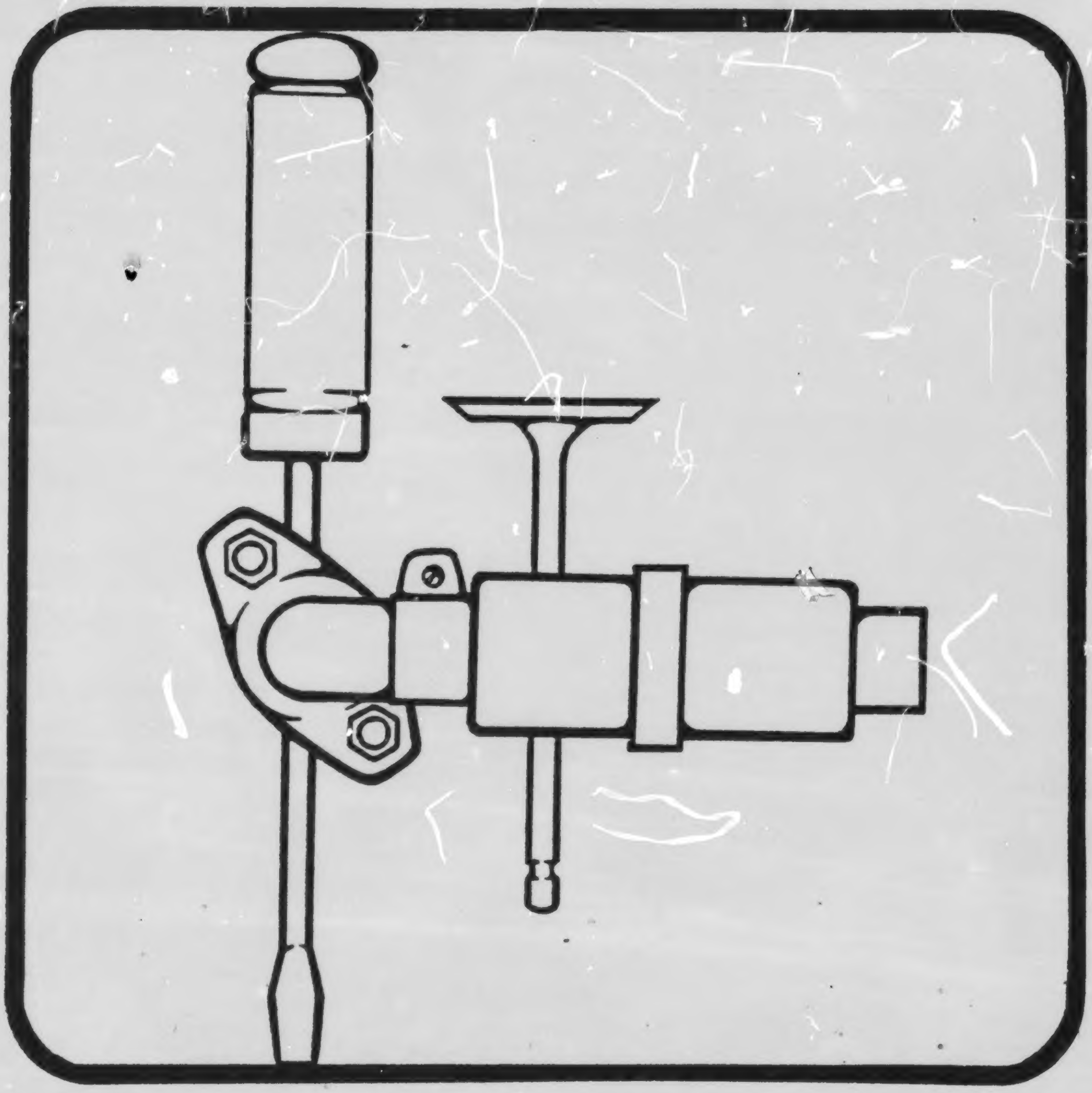
10. CLEAN UP THE MACHINE AND YOUR WORK AREA. →

LOOK:



CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

1. REPLACED SPARK PLUG, BUT NOT SPARK PLUG WIRE.
2. CLEANED UP THE MACHINE AND YOUR WORK AREA.



small engine repair

unit: STORAGE

capital area career center

module: 7501 21 002 1
7501 21 002 3 date: DECEMBER 1977 level: I

skill title: PREPARING A CHAINSAW FOR STORAGE

developed & written by: DON FOSTER AND DWIGHT SMITH

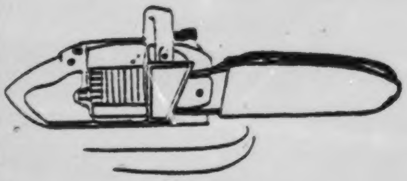
visuals by: DAVE WEHRWEIN & BRUCE BENNETT

PERFORMANCE OBJECTIVE

YOU ARE GOING TO LEARN:

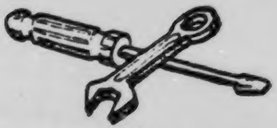
HOW AND WHY YOU PREPARE A CHAINSAW FOR STORAGE.

AND IN ORDER TO DO THIS YOU WILL NEED:



CHAINSAW IN RUNNING ORDER

CONTAINER FOR GAS



HAND TOOLS

CAN OF OIL

WE WILL KNOW YOU CAN DO IT WHEN:

1. YOU HAVE GATHERED THE MATERIALS FOR THIS MODULE.
2. YOU HAVE FOLLOWED THE JOB STEPS TO PREPARE A CHAINSAW FOR STORAGE.
3. YOU ARE ABLE TO ANSWER YOUR INSTRUCTORS ABOUT THIS MODULE.
4. YOU HAVE PUT AWAY THE MATERIALS AND CLEANED UP THE WORK AREA.

"TURN THE PAGE"

WORD GUIDE

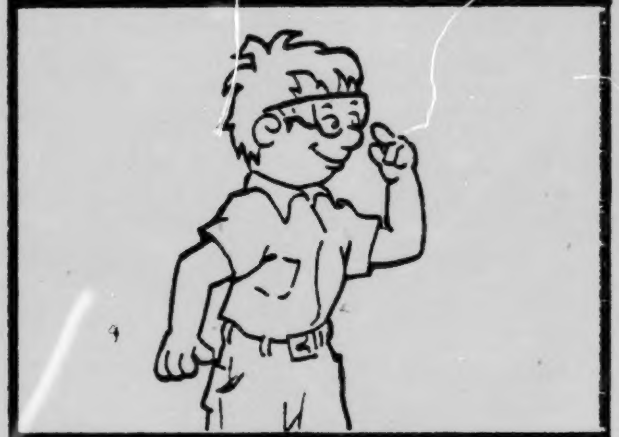
VARNISH - A STICKY SUBSTANCE LEFT AFTER GASOLINE EVAPORATES.

JOB STEPS

READ: LOOK:

1. GET THE MATERIALS LISTED ON PAGE 2 OF THIS MODULE.

2. PUT ON YOUR SAFETY GLASSES.



3. NOW, READ THIS INFORMATION. YOU PREPARE A CHAINSAW FOR STORAGE SO THAT THE GASOLINE LEFT IN IT WILL NOT TURN TO VARNISH AND GUM UP THE MOVING PARTS. ALSO, THE CHAIN MIGHT RUST IF NOT TAKEN CARE OF. THE COMPRESSION RELEASE MUST BE CLOSED FOR STORAGE TO STOP MOISTURE FROM GETTING IN THE ENGINE.

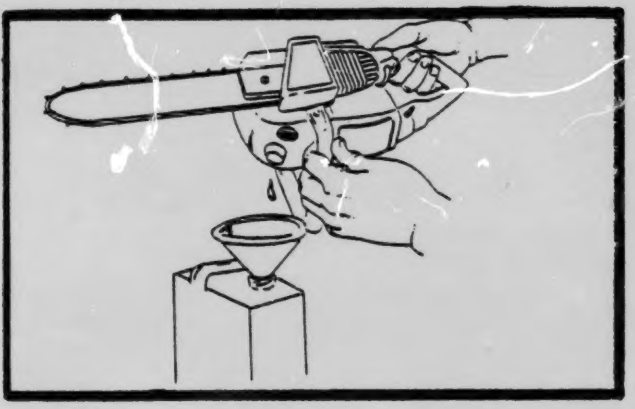
"TURN THE PAGE"

JOB STEPS

READ:

LOOK:

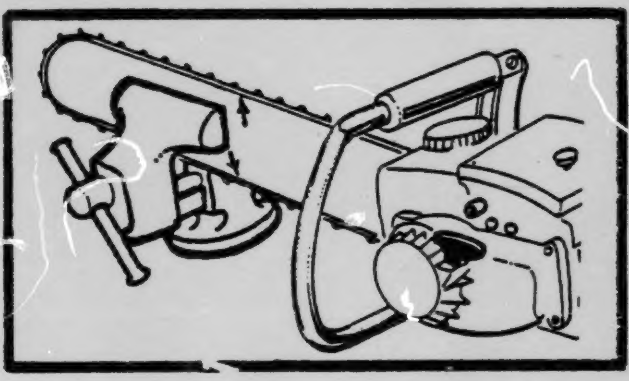
4. REMOVE THE GAS CAP AND DRAIN THE GAS/OIL MIXTURE INTO A SAFE CONTAINER.



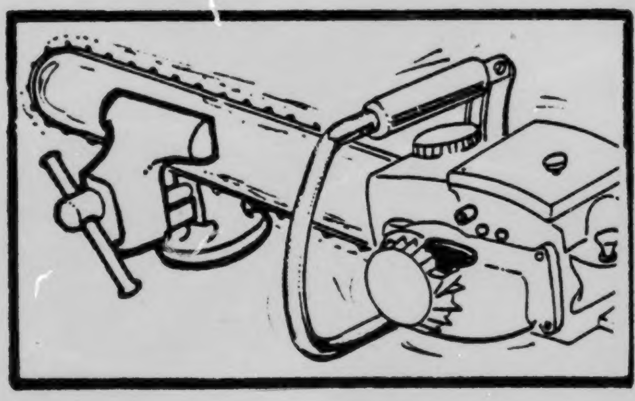
CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

1. ALL THE MATERIALS FOR THIS MODULE.
2. YOUR SAFETY GLASSES.
3. READ THE REASONS FOR PREPARING A CHAINSAW FOR STORAGE.
4. DRAINED THE GAS INTO A SAFE CONTAINER.

5. CLAMP THE GUIDE BAR INTO A VISE. BE SURE THE CHAIN DOES NOT TOUCH THE VISE ANYWHERE.



6. START THE ENGINE AND RUN ALL THE GAS OUT OF IT. KEEP STARTING IT UNTIL IT WILL NOT RUN AT ALL.

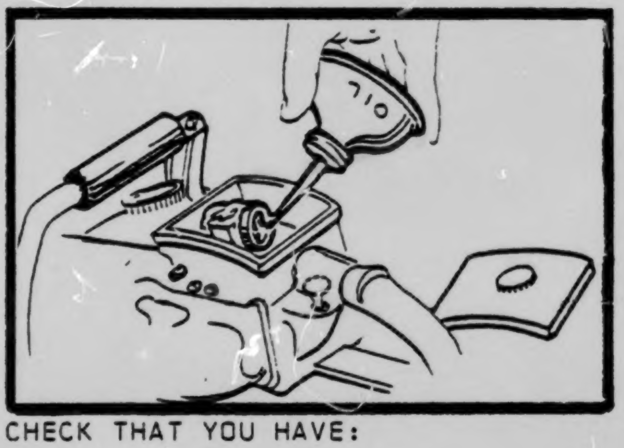


"TURN THE PAGE"

JOB STEPS

READ: LOOK:

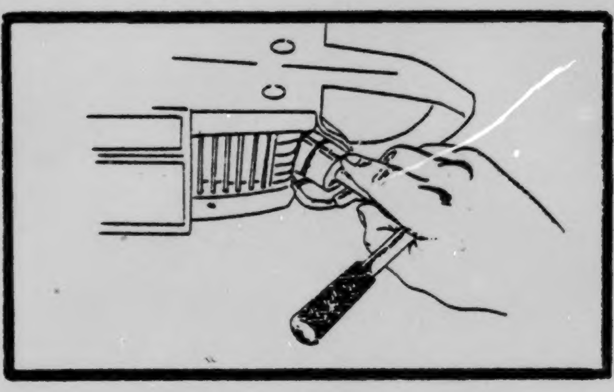
7. USE THE OIL CAN AND SQUIRT A SMALL AMOUNT (2 OR 3 DROPS) OF OIL INTO THE THROAT OF THE CARBURETOR.



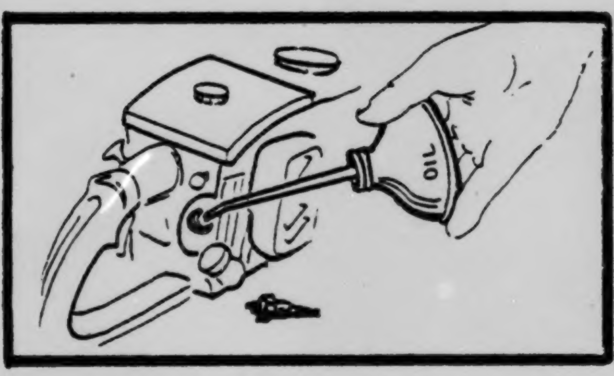
CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

1. CLAMPED THE SAW PROPERLY.
2. RAN ALL THE GAS OUT OF THE SAW.
3. PUT SOME OIL INTO THE CARBURETOR.

8. USE A SPARK PLUG WRENCH AND TAKE THE SPARK PLUG OUT OF THE ENGINE.



9. USE THE OIL CAN TO SQUIRT A SMALL AMOUNT OF OIL INTO THE SPARK PLUG HOLE.

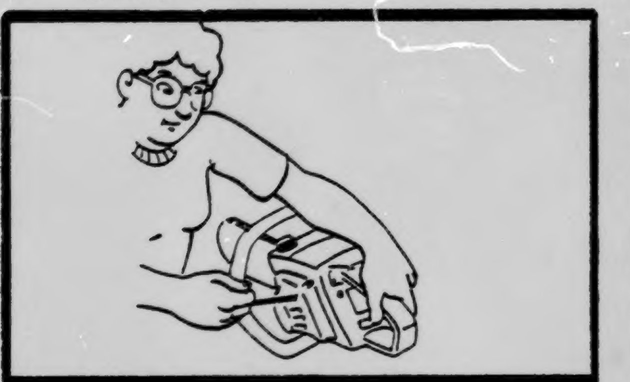


"TURN THE PAGE"

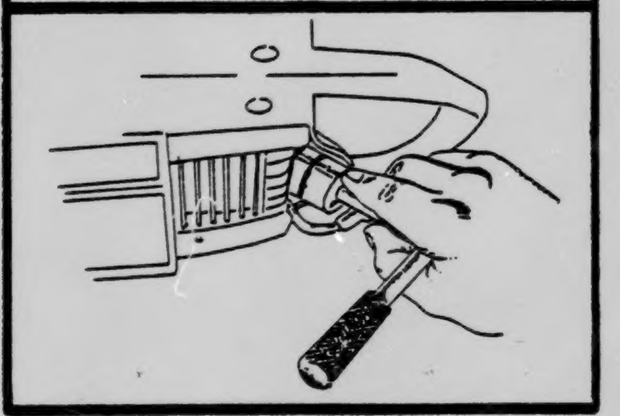
JOB STEPS

READ: LOOK:

10. TURN THE ENGINE OVER WITH THE STARTER TO SPREAD THE OIL. THIS PROTECTS THE PISTON AND RINGS FROM RUST.



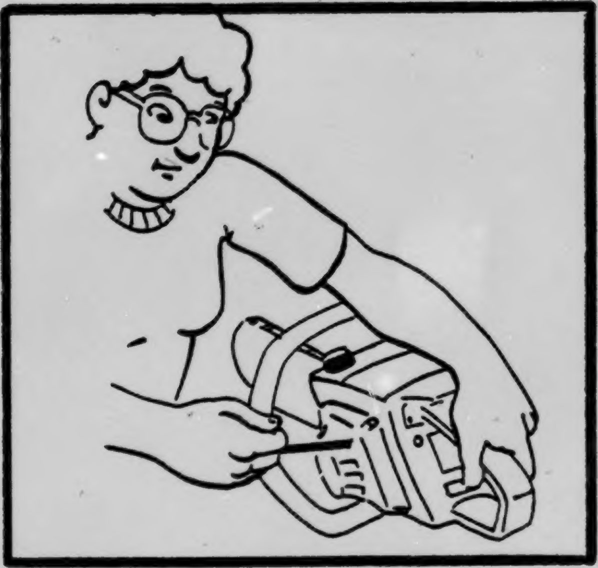
11. PUT THE SPARK PLUG BACK IN THE ENGINE.



CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

1. REMOVED THE SPARK PLUG.
2. OILED THE PISTON AND REPLACED THE SPARK PLUG.

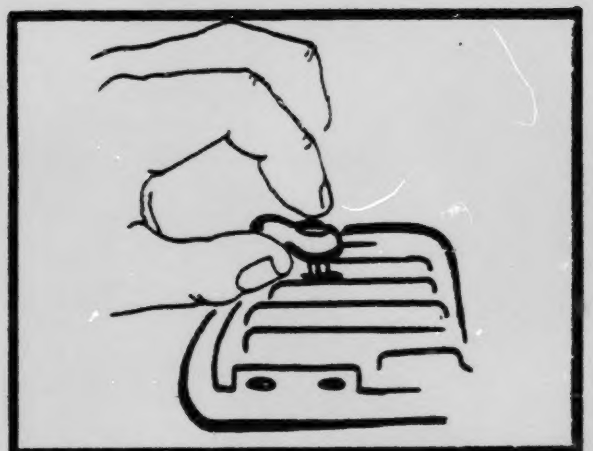
12. PULL THE STARTER UNTIL THE ENGINE IS ON THE COMPRESSION STROKE. IF YOU HAVE TROUBLE FINDING THE COMPRESSION STROKE, ASK YOUR INSTRUCTOR FOR HELP.



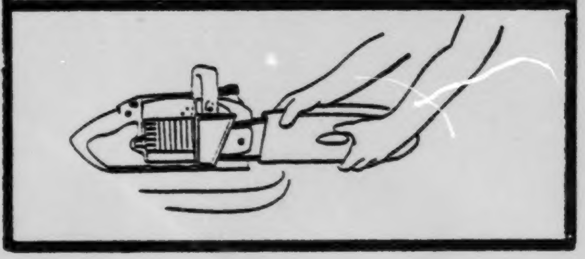
"TURN THE PAGE"

JOB STEPS

13. BE SURE THE COMPRESSION RELEASE IS CLOSED, IF THE SAW HAS ONE.

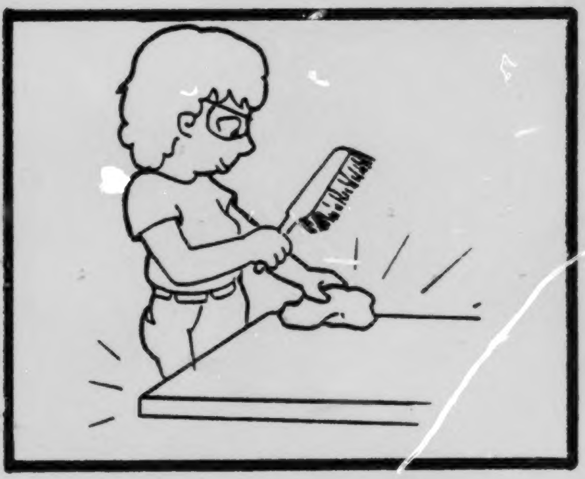


14. IF THE SAW HAS A BAR PROTECTOR, OR SOMETHING TO COVER THE SAW, PUT IT ON NOW.



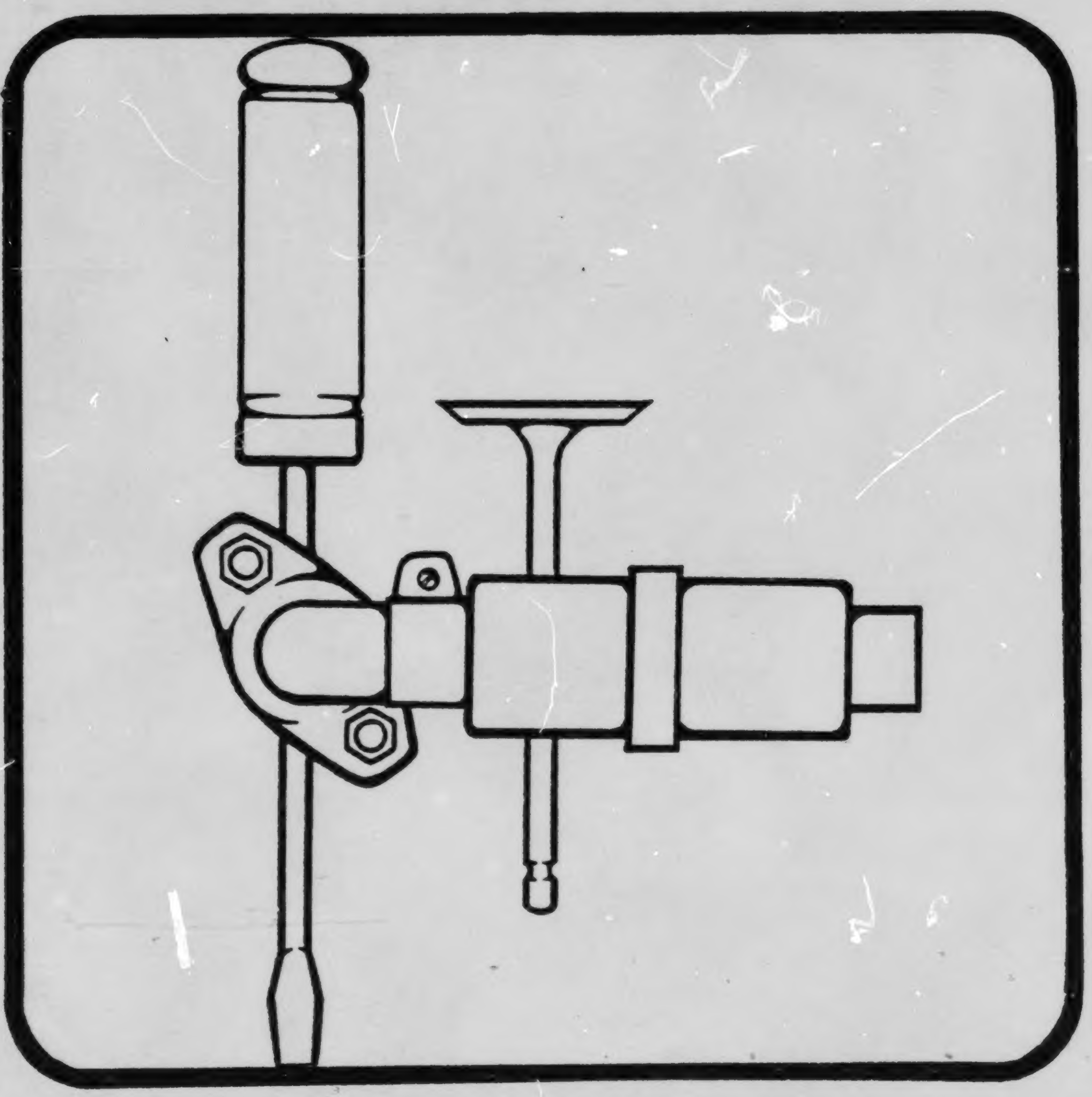
15. PUT AWAY ALL THE TOOLS AND MATERIALS YOU GOT OUT.

16. CLEAN UP THE WORK AREA.



CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

1. TURNED THE ENGINE TO THE COMPRESSION STROKE.
2. CLOSED THE COMPRESSION RELEASE.
3. PUT ON THE COVER OR BAR PROTECTOR.
4. CLEANED UP YOUR AREA.



small engine repair

unit: STORAGE

capital area career center

module: 7501 21 003 1
7501 21 003 3 date: APRIL 1978 level: I

skill title: PREPARING A SNOWMOBILE FOR STORAGE

developed & written by: JACK HELDER

visuals by: STEVE BRAMER

PERFORMANCE OBJECTIVE

YOU ARE GOING TO LEARN:

HOW TO PREPARE A SNOWMOBILE FOR STORAGE.

IN ORDER TO DO THIS YOU WILL NEED:

SET OF HAND TOOLS

SNOWMOBILE THAT RUNS WELL

CAN OF OIL

GREASE GUN

WE WILL KNOW YOU CAN DO IT WHEN:

1. YOU HAVE THE EQUIPMENT YOU WILL NEED.
2. YOU HAVE DRAINED THE GAS FROM THE TANK AND LINES.
3. YOU HAVE OILED THE PISTON HEAD.
4. YOU HAVE RAISED THE TRACK.

"TURN THE PAGE"

JOB STEPS

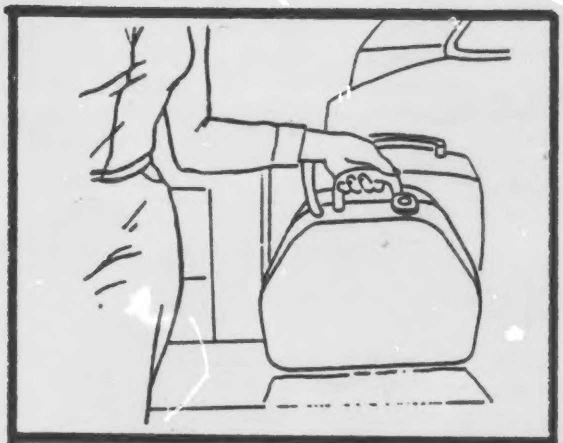
READ: LOOK:

1. REMOVE GAS LINE FROM TANK.

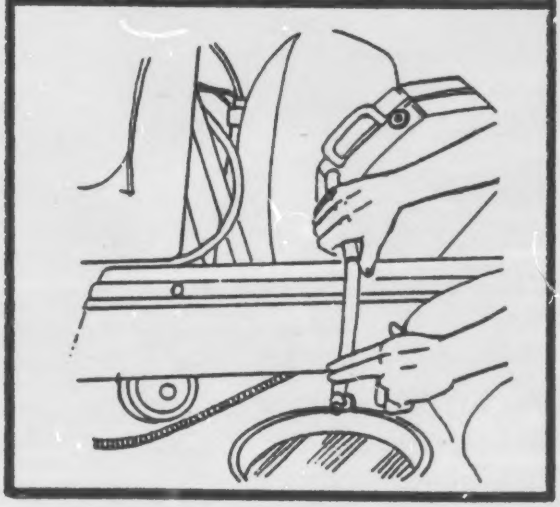
2. DRAIN GAS FROM LINE INTO A GAS CAN.

3. DRAIN GAS FROM TANK.

   A. REMOVE TANK AND DRAIN INTO A GAS CAN, IF EASY TO DO. →



   B. OR, SIPHON GAS FROM TANK INTO A GAS CAN. →



4. RAISE TRACK OFF THE FLOOR SO IT TOUCHES NOTHING.

"TURN THE PAGE"

JOB STEPS

READ: LOOK:

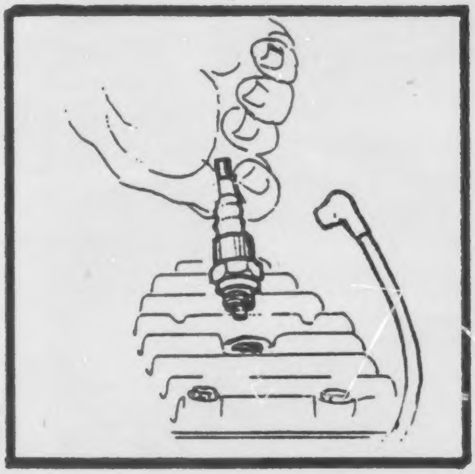
5. START ENGINE AND LET IT RUN UNTIL IT QUITS.

6. TRY TO RESTART ENGINE UNTIL YOU ARE SURE GAS IS OUT OF CARBURETOR.

CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

1. DRAINED GAS LINES.
2. DRAINED GAS TANK.
3. RAISED TRACK OFF FLOOR.
4. RUN ENGINE UNTIL ALL GAS IS OUT OF CARBURETOR.

7. REMOVE SPARK PLUG. →



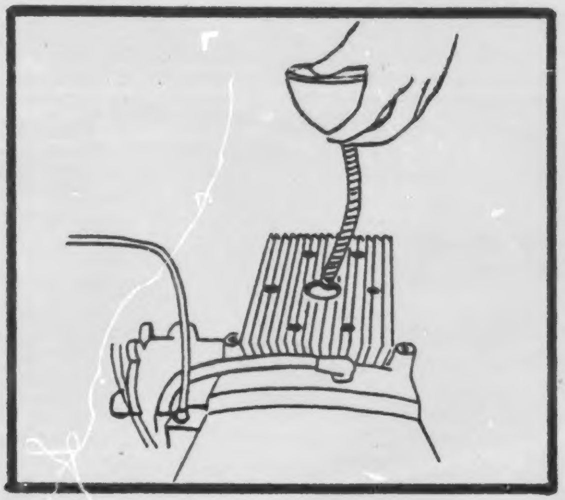
"TURN THE PAGE"

JOB STEPS

READD:

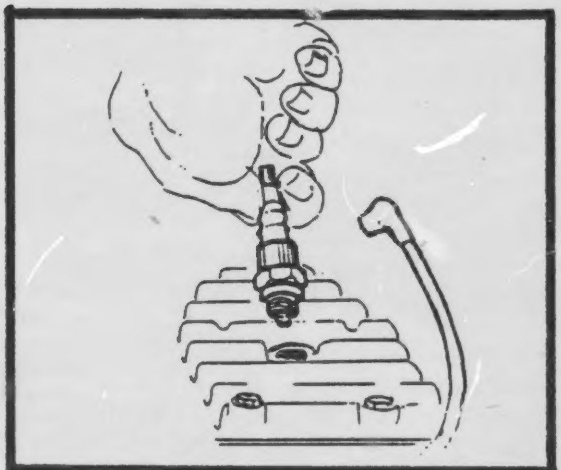
LOOK:

8. SQUIRT OIL ONE TIME INTO CYLINDER.

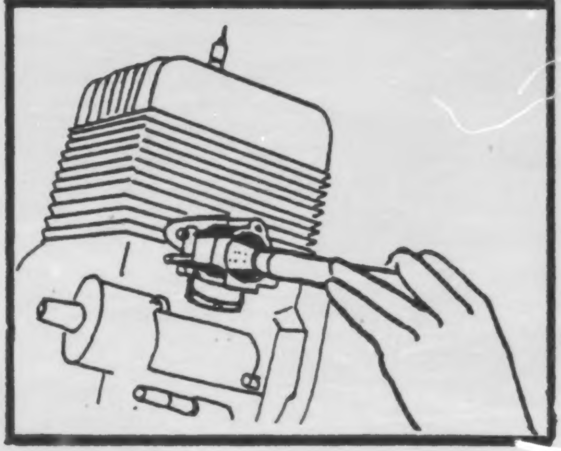


9. CRANK ENGINE OVER 4 OR 5 TIMES SO THAT OIL SPREADS INSIDE CYLINDER.

10. REPLACE SPARK PLUG.



11. HOLD OPEN THROTTLE AND LOOK IN CARBURETOR. MAKE SURE PISTON IS COVERING ALL OF INTAKE PART.

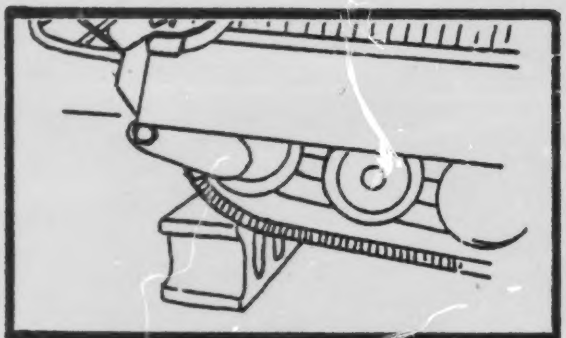


"TURN THE PAGE"

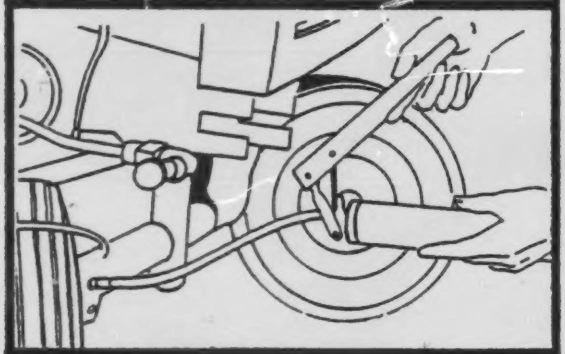
JOB STEPS

READ: LOOK:

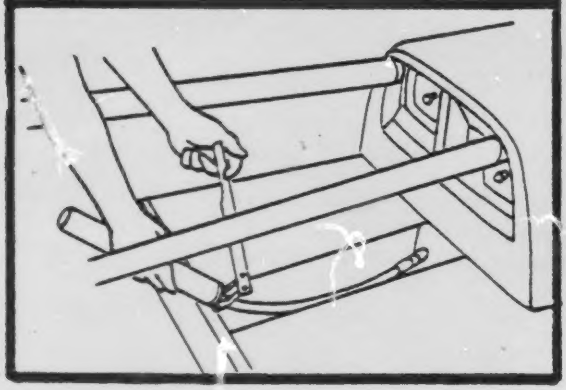
12. BLOCK UP THE TRACK SO IT DOES NOT TOUCH GROUND OR FLOOR.



13. GREASE OR OIL SPINDLES.



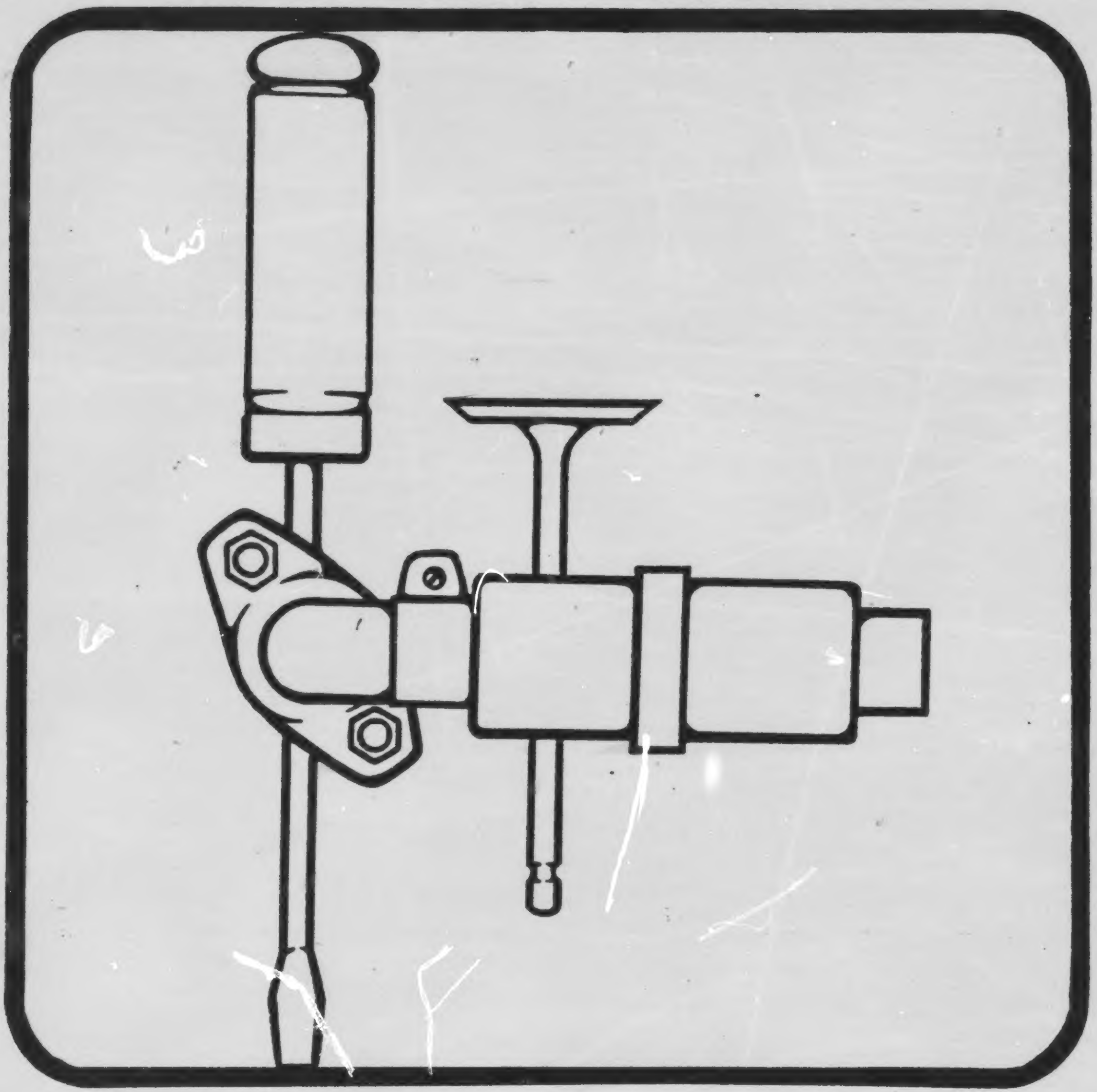
14. GREASE ALL FITTINGS.



15. CLEAN UP YOUR AREA.

CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

1. OILED CYLINDER.
2. REPLACED PLUG.
3. MADE SURE PISTON COVERS INTAKE PART.
4. GREASED OR OILED SPINDLES.
5. GREASED ALL FITTINGS.
6. CLEANED UP YOUR AREA.



small engine repair

unit: FILLING OUT FORMS

capital area career center

7501 22 001 1
module: 7501 22 001 3 date: JANUARY 1978 level: I

skill title: WRITING A WORK ORDER PROPERLY

developed & written by: DEBI WHITE

visuals by: NANCY LOMBARDI

WORD GUIDE

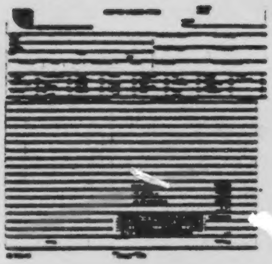
WORK ORDER - A WRITTEN ORDER FOR WORK TO BE DONE ON A MACHINE

PERFORMANCE OBJECTIVE

YOU ARE GOING TO LEARN:

HOW TO FILL OUT A WORK ORDER.

AND IN ORDER TO DO THIS YOU WILL NEED:



WORK ORDER

IDENTIFICATION TAG

PENCIL

AN ENGINE OR MACHINE -- MOWER, CHAINSAW, SNOWMOBILE

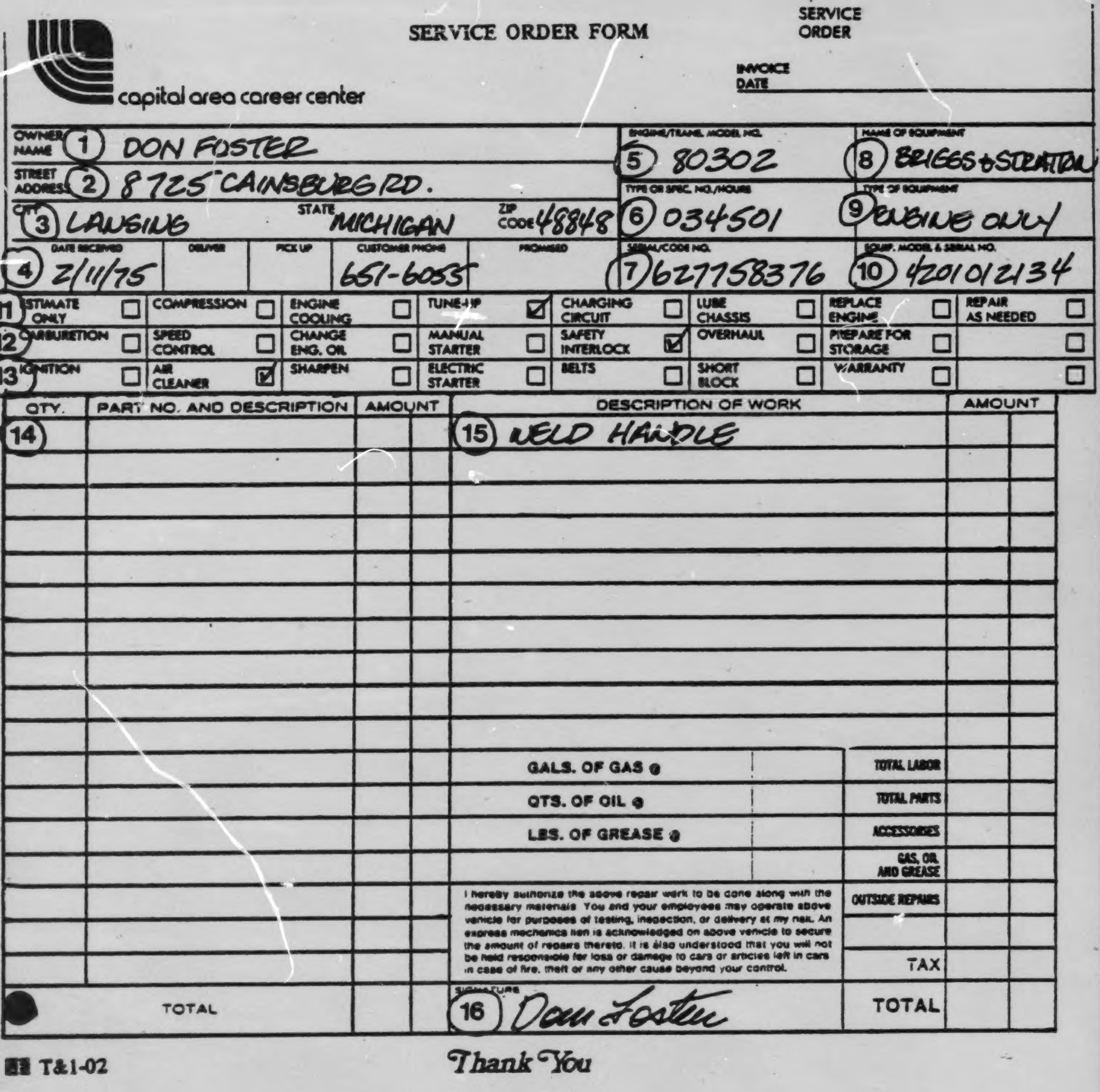
WE WILL KNOW YOU CAN DO IT WHEN:

1. YOU READ THE MODULE.
2. YOU GET YOUR EQUIPMENT.
3. YOU DO THE JOB STEPS FOR FILLING OUT A WORK ORDER.
4. YOU FILL OUT 5 WORK ORDERS.

TURN THE PAGE

INFORMATION

THIS IS A SAMPLE OF A COMPLETED ORDER FORM. THE LINES YOU ARE TO WRITE IN ARE NUMBERED TO HELP YOU FILL OUT THE FORM IN THE CORRECT ORDER.



capital area career center

SERVICE ORDER FORM

SERVICE ORDER

INVOICE DATE

OWNER NAME ① DON FOSTER
STREET ADDRESS ② 8725 CAINSBURG RD.
CITY ③ LANSING STATE MICHIGAN ZIP CODE 48848
DATE RECEIVED ④ 2/11/75
DELIVER
PICK UP
CUSTOMER PHONE 651-6055
PROMISED
ENGINE/TRANS. MODEL NO. ⑤ 80302
TYPE OR SPEC. NO./HOURS ⑥ 034501
SERIAL/CODE NO. ⑦ 627758376
NAME OF EQUIPMENT ⑧ BRIGGS & STRATTON
TYPE OF EQUIPMENT ⑨ ENGINE ONLY
EQUIP. MODEL & SERIAL NO. ⑩ 4201012134

⑪ ESTIMATE ONLY ☐	COMPRESSION ☐	ENGINE COOLING ☐	TUNE-UP ☑	CHARGING CIRCUIT ☐	LUBE CHASSIS ☐	REPLACE ENGINE ☐	REPAIR AS NEEDED ☐
⑫ CARBURETION ☐	SPEED CONTROL ☐	CHANGE ENG. OIL ☐	MANUAL STARTER ☐	SAFETY INTERLOCK ☑	OVERHAUL ☐	PREPARE FOR STORAGE ☐	☐
⑬ IGNITION ☐	AIR CLEANER ☑	SHARPEN ☐	ELECTRIC STARTER ☐	BELTS ☐	SHORT BLOCK ☐	WARRANTY ☐	☐

QTY.	PART NO. AND DESCRIPTION	AMOUNT	DESCRIPTION OF WORK	AMOUNT
⑭			⑮ WELD HANDLE	
TOTAL				

GALS. OF GAS @
QTS. OF OIL @
LBS. OF GREASE @

TOTAL LABOR	
TOTAL PARTS	
ACCESSORIES	
GAS, OIL AND GREASE	
OUTSIDE REPAIRS	
TAX	
TOTAL	

I hereby authorize the above repair work to be done along with the necessary materials. You and your employees may operate above vehicle for purposes of testing, inspection, or delivery at my risk. An express mechanics lien is acknowledged on above vehicle to secure the amount of repairs thereto. It is also understood that you will not be held responsible for loss or damage to cars or articles left in cars in case of fire, theft or any other cause beyond your control.

SIGNATURE ⑯ Don Foster

T&1-02

Thank You

TURN THE PAGE

WORD GUIDE

LAWSUIT - SUE FOR MONEY BECAUSE A JOB WAS NOT DONE RIGHT; GO TO COURT

CUSTOMER - PERSON THAT WANTS WORK DONE

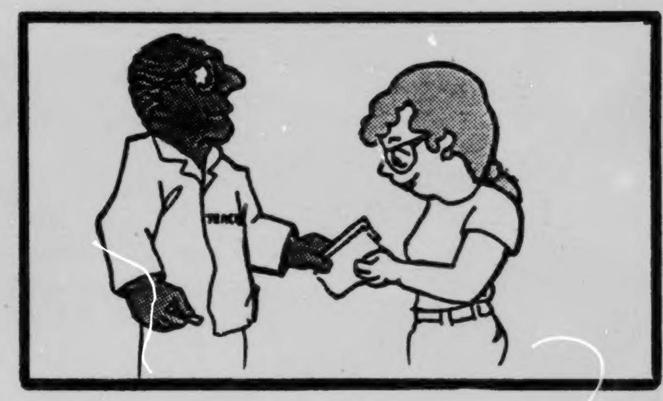
JOB STEPS

READ: LOOK:

1. IT IS VERY IMPORTANT TO FILL OUT A WORK ORDER RIGHT. A WORK ORDER THAT IS NOT RIGHT CAN MAKE YOU:

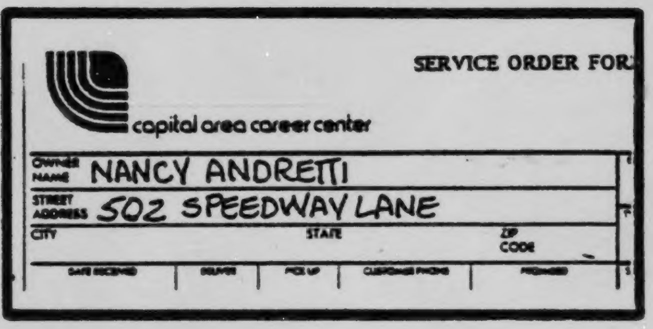
   A. GIVE AWAY PARTS; OR
   B. MAKE YOU PAY MONEY FOR A LAWSUIT.

2. ASK YOUR INSTRUCTOR FOR SAMPLE WORK ORDER FORMS.



3. WRITE THE CUSTOMER'S NAME. USE YOUR NAME.

4. WRITE YOUR STREET ADDRESS.



SERVICE ORDER FOR

capital area career center

OWNER NAME NANCY ANDRETTI

STREET ADDRESS 502 SPEEDWAY LANE

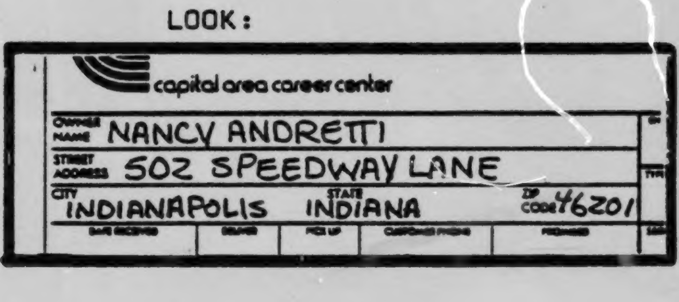
CITY STATE ZIP CODE

TURN THE PAGE

JOB STEPS

READ: LOOK:

5. WRITE YOUR CITY, STATE, AND ZIP CODE.



capital area career center

OWNER NAME NANCY ANDRETTI

STREET ADDRESS 502 SPEEDWAY LANE

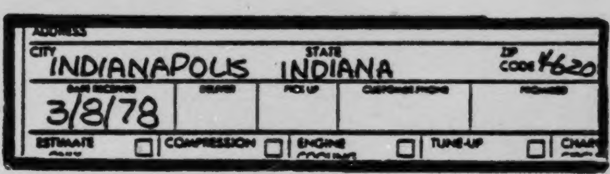
CITY INDIANAPOLIS STATE INDIANA ZIP CODE 46201

CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

1. WRITTEN THE CUSTOMER'S NAME USING YOUR NAME.
2. WRITTEN THE STREET ADDRESS.
3. WRITTEN THE CITY, STATE, AND ZIP CODE.

6. LINE 4: WRITE THE DATE YOU GOT THE MACHINE TO WORK ON IT. WRITE TODAY'S DATE.

NOTE: DON'T WRITE IN THE "DELIVER" AND "PICK-UP" BLANKS.



ADDRESS

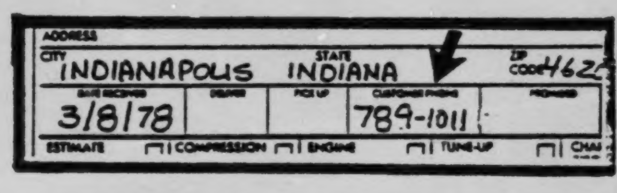
CITY INDIANAPOLIS STATE INDIANA ZIP CODE 4620

3/8/78

ESTIMATE ☐ COMPRESSION ☐ ENGINE ☐ TUNE-UP ☐

7. WRITE YOUR PHONE NUMBER.

NOTE: DON'T WRITE IN THE "PROMISED" BLANK.



ADDRESS

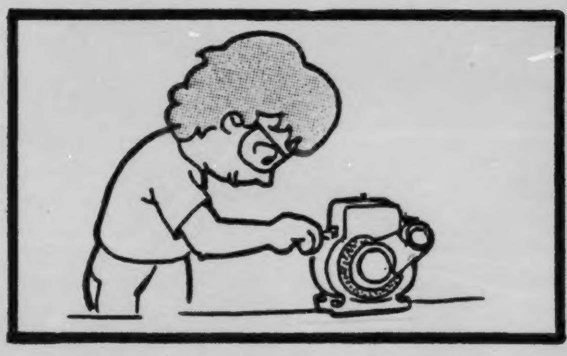
CITY INDIANAPOLIS STATE INDIANA ZIP CODE 462

3/8/78 789-1011

ESTIMATE ☐ COMPRESSION ☐ ENGINE ☐ TUNE-UP ☐

8. CHOOSE AN ENGINE OR A MACHINE.

NOTE: YOU WILL USE THIS MACHINE TO FINISH THIS WORK ORDER.



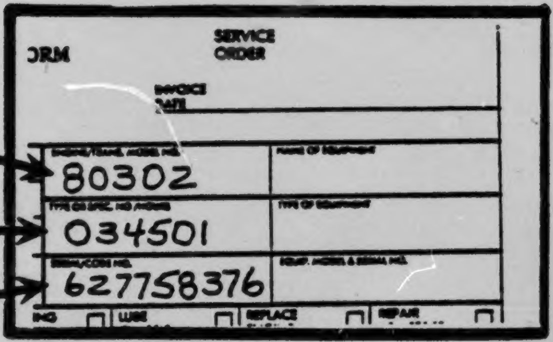
TURN THE PAGE

JOB STEPS

READ: LOOK:

CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

1. WRITTEN THE DATE YOU GOT THE MACHINE.
2. WRITTEN THE PHONE NUMBER.
3. CHOSEN AN ENGINE OR MACHINE.



ORM
SERVICE ORDER
INVOICE DATE
80302
034501
6277583376
LUBE ☐
REPLACE ☐
REPAIR ☐

9. FILL IN EACH LINE:

LINE 5: FIND THE MODEL NUMBER. WRITE THE MODEL NUMBER.

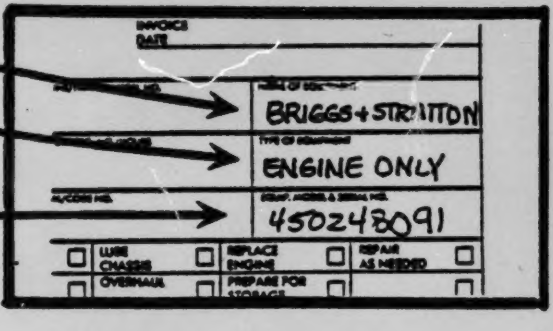
LINE 6: WRITE THE TYPE NUMBER. ASK YOUR INSTRUCTOR.

LINE 7: WRITE THE SERIAL NUMBER. ASK YOUR INSTRUCTOR.

LINE 8: WRITE THE BRAND NAME OF THE ENGINE. ASK YOUR INSTRUCTOR.

LINE 9: WRITE THE KIND OF MACHINE.

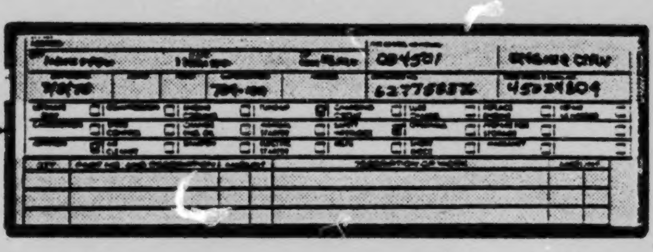
LINE 10: IF YOU CHOSE A MACHINE (TILLER, SNOWMOBILE, MOWER, ETC.) WRITE THE EQUIPMENT MODEL NUMBER AND SERIAL NUMBERS ON THIS LINE. ASK YOUR INSTRUCTOR.



INVOICE DATE
BRIGGS + STRATTON
ENGINE ONLY
450248091
☐ LUBE CHASSIS ☐ REPLACE ENGINE ☐ REPAIR AS NEEDED ☐
☐ OVERHAUL ☐ PREPARE FOR STORAGE ☐ ☐

CHECK: ASK YOUR INSTRUCTOR TO CHECK YOUR WORK.

10. LINES 11, 12, AND 13: THESE LINES ARE FOR THE JOBS THAT MUST BE DONE. PUT A CHECK IN THE BOX OF THE JOB YOU WANT TO DO.

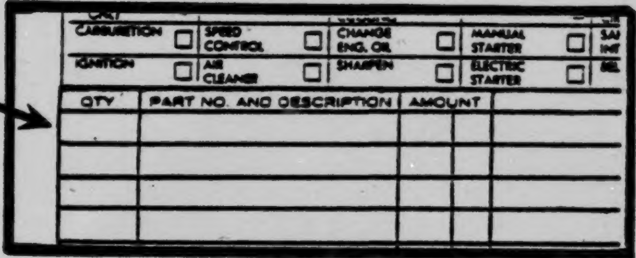


TURN THE PAGE

JOB STEPS

READ: LOOK:

11. DO NOT WRITE ON LINE 14.



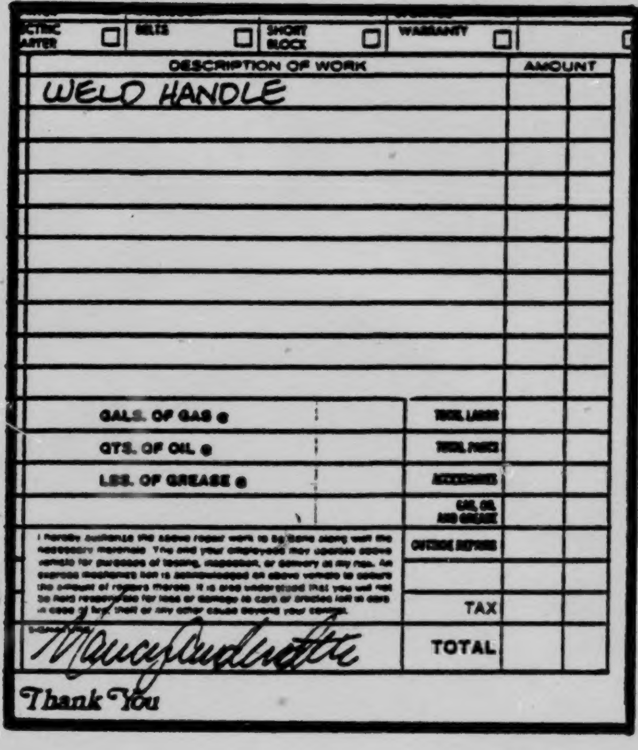
CARBURETION ☐	SPEED CONTROL ☐	CHANGE ENG. OIL ☐	MANUAL STARTER ☐
IGNITION ☐	AIR CLEANER ☐	SHARPEN ☐	ELECTRIC STARTER ☐

QTY	PART NO. AND DESCRIPTION	AMOUNT

12. LINE 15: IF THE JOB YOU WANT TO DO IS NOT ON LINES 11, 12, OR 13, WRITE THE JOB YOU WANT TO DO.

13. LINE 16: THE CUSTOMER MUST WRITE HIS NAME ON THIS LINE. WRITE YOUR NAME. IT IS VERY IMPORTANT THAT THE CUSTOMER SIGNS THE WORK ORDER.

NOTE: THE CUSTOMER DOES NOT HAVE TO PAY IF THIS LINE IS NOT SIGNED. THE CUSTOMER CAN HAVE HIS MACHINE WITHOUT PAYING. CHECK YOUR WORK ORDER. ASK YOUR INSTRUCTOR TO CHECK YOUR WORK ORDER.



ECTRIC ARTER ☐	BELTS ☐	SHORT BLOCK ☐	WARRANTY ☐

DESCRIPTION OF WORK	AMOUNT
WELD HANDLE	

GALS. OF GAS @

QTS. OF OIL @

LBS. OF GREASE @

TAX

TOTAL

Thank You

14. CHOOSE A DIFFERENT MACHINE OR ENGINE. REPEAT JOB STEPS 2 - 13.

CHECK: ASK AN ADVANCED STUDENT TO CHECK YOUR WORK ORDER.

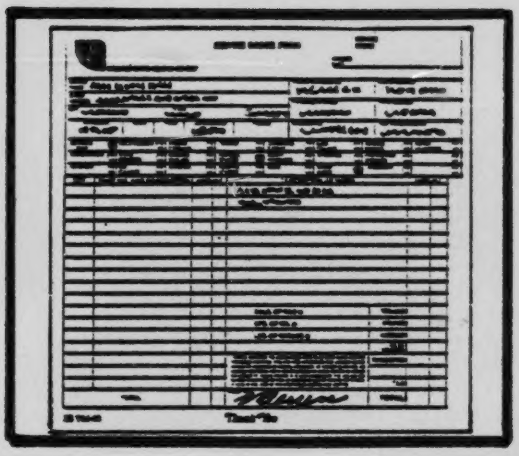
TURN THE PAGE

JOB STEPS

READ:

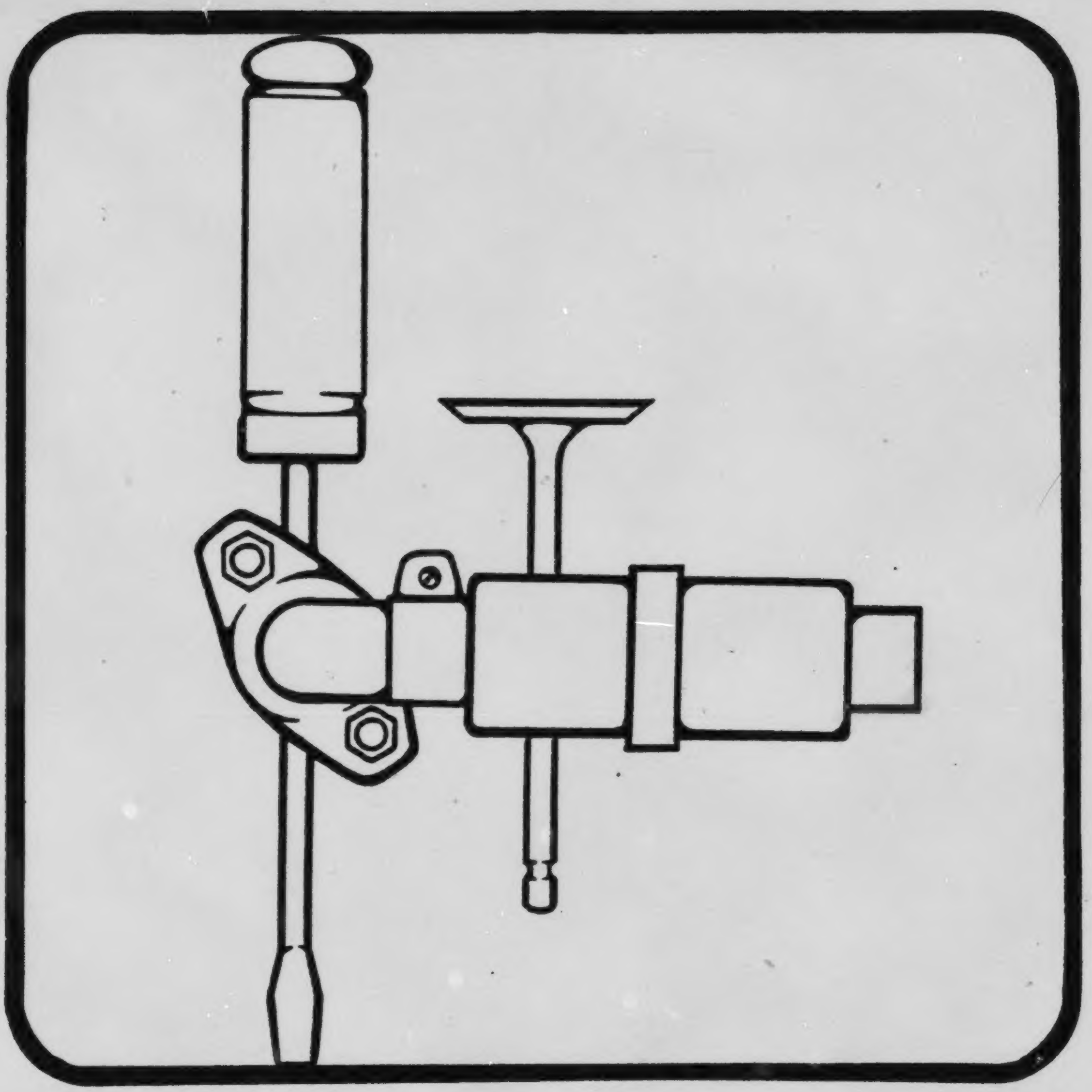
15. REPEAT JOB STEP 14. DO IT 3 MORE TIMES. FILL OUT THREE MORE WORK ORDERS.

LOOK:



CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

1. 5 WORK ORDERS.
2. CHECKED YOUR WORK.
3. ASKED YOUR INSTRUCTOR TO DOUBLE CHECK YOUR WORK ORDERS.
4. TOLD YOUR INSTRUCTOR HOW TO FILL OUT A WORK ORDER.



small engine repair

unit: ENGINE BLOCK

capital area career center

module: 7501 23 001 1
7501 23 001 3 date: APRIL 1977 level: I

skill title: HOW TO REMOVE AND REPLACE PISTON RINGS

developed & written by: DON FOSTER AND DWIGHT SMITH

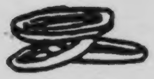
visuals by: DAVE WEHRWEIN

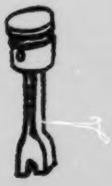
PERFORMANCE OBJECTIVE

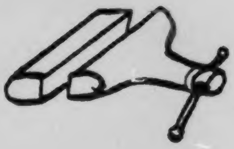
YOU ARE GOING TO LEARN:

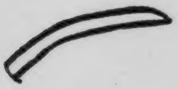
1. HOW TO TAKE OFF AND PUT BACK ON PISTON RINGS.
2. HOW TO CLEAN RING GROOVES.

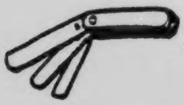
AND IN ORDER TO DO THIS YOU WILL NEED:

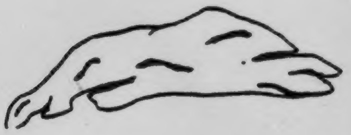

A RING SET

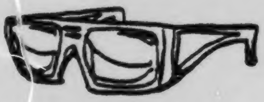

A PISTON AND ROD

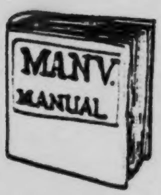

A VISE


A RING GROOVE CLEANER


FEELER GAUGE


CLOTH


SAFETY GLASSES



REPAIR MANUAL IV

WE WILL KNOW YOU CAN DO IT WHEN:

1. YOU HAVE GATHERED ALL YOUR EQUIPMENT.
2. YOU HAVE REMOVED THE OLD RINGS.
3. YOU HAVE CLEANED ALL THE CARBON FROM THE RING GROOVES.
4. YOU HAVE PUT ON NEW RINGS WITHOUT BREAKING ANY.
5. YOU HAVE CHECKED THE RING LAND CLEARANCE AND YOU CAN TELL IF YOU NEED A NEW PISTON.

"TURN THE PAGE"

INFORMATION

AS YOU KNOW, PISTONS ARE IMPORTANT TO AN ENGINE. THEY MAKE THE ENGINE DO THE WORK IT WAS MEANT TO DO. FOR THE PISTONS TO DO THAT, THEY HAVE TO FIT TIGHTLY IN THE CYLINDER. THERE ARE RINGS AROUND THE PISTON WHICH HELP THE PISTON FIT SNUGLY IN THE CYLINDER. THIS ALLOWS THE ENGINE TO KEEP ITS COMPRESSION. COMPRESSION IS A KIND OF PRESSURE WHICH GIVES THE ENGINE POWER TO WORK.

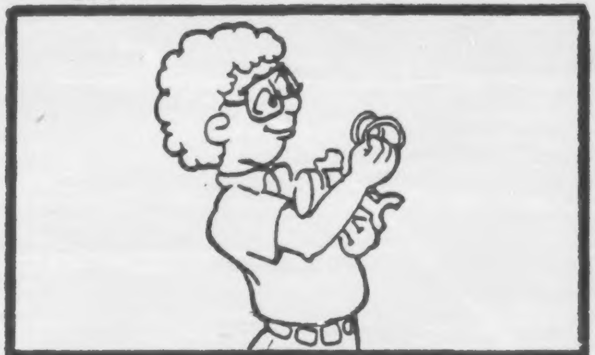
BECAUSE OF AN ENGINE'S NEED FOR COMPRESSION, WE HAVE TO MAKE CERTAIN THE RINGS FIT TIGHTLY AROUND THE PISTON. SO WHEN YOU PUT NEW RINGS ON, IT IS IMPORTANT TO CLEAN THE RING GROOVES. CARBON GETS UNDER THE OLD RINGS, AND THIS MATERIAL HAS TO BE CLEANED OUT. IF IT ISN'T THE SEAL BETWEEN PISTON AND RINGS WON'T BE GOOD.

PISTON RINGS ARE MADE OF VERY HARD, BUT EASY TO BREAK METAL. BECAUSE THEY WILL BREAK VERY EASILY, THEY WILL HAVE TO BE HANDLED WITH CARE.

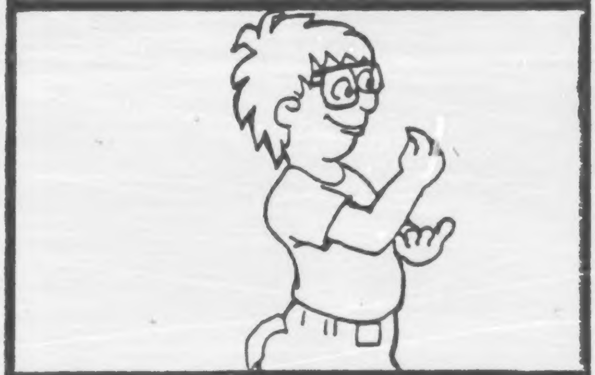
JOB STEPS

READ: LOOK:

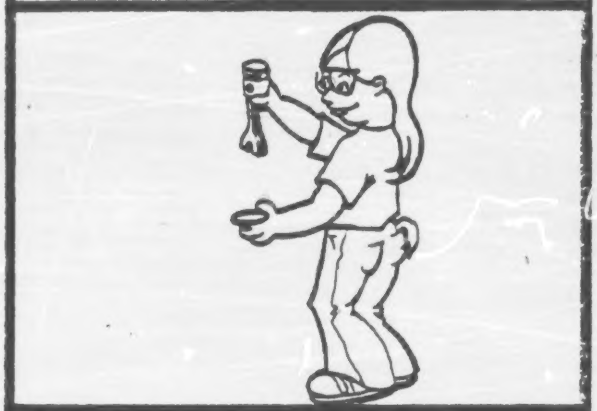
1. GET ALL YOUR EQUIPMENT AND TAKE IT TO YOUR WORK AREA.



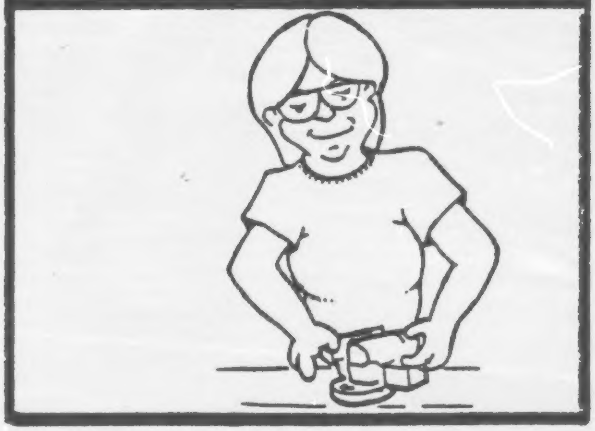
2. PUT ON YOUR SAFETY GLASSES.



3. NOW GET THE PISTON AND RING SET ON WHICH YOU WILL WORK.



4. CONNECT THE VISE TO YOUR WORK TABLE.



"TURN THE PAGE"

JOB STEPS

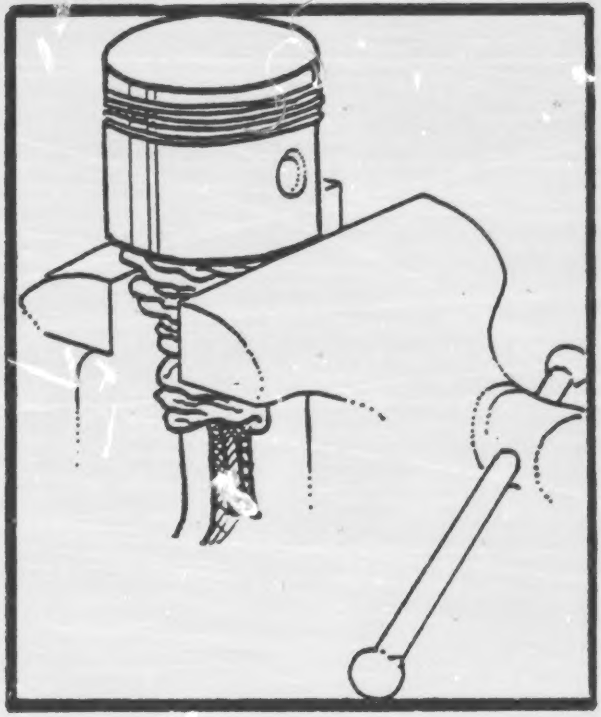
READ:

5. HOLD THE PISTON AND PUT THE CONNECTING ROD IN THE VISE. DO NOT CLAMP TOO TIGHT.

NOTE: PUT A RAG AROUND CONNECTING ROD FOR PROTECTION BEFORE PUTTING IT IN THE VISE.

LOOK:

→



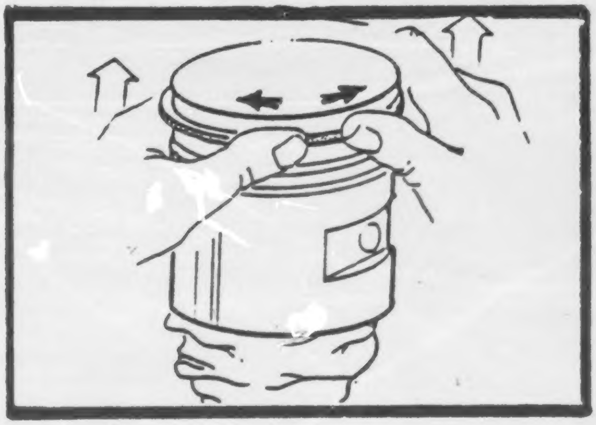
CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

1. ALL YOUR EQUIPMENT.
2. CONNECTED THE VISE IN AN OK WAY.
3. CLAMPED THE CONNECTING ROD.

6. NOW IT'S TIME TO TAKE OFF THE OLD RINGS. PUT YOUR HANDS AROUND THE TOP RING, WITH YOUR THUMBS ON THE RING ENDS.

7. NOW SPREAD OPEN THE TOP RING. WHEN THE RING IS LARGER THAN THE PISTON, LIFT THE RING OFF THE PISTON.

→

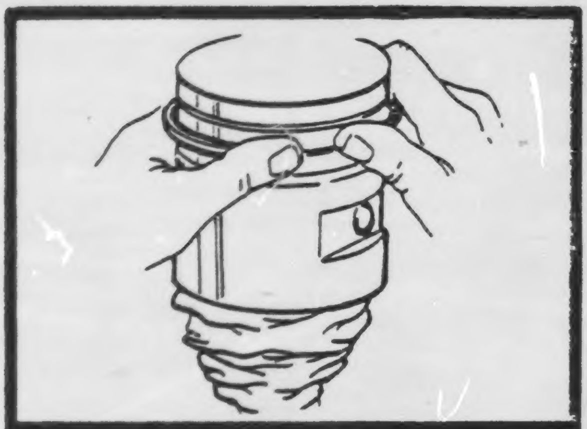


"TURN THE PAGE"

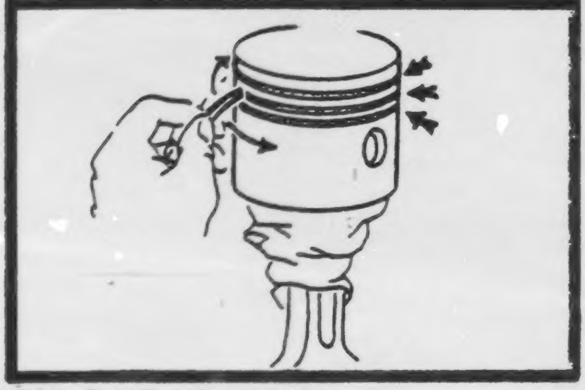
JOB STEPS

READ: LOOK:

8. DO JOB STEPS 6 AND 7 OVER FOR THE SECOND RING.



9. USE A RING GROOVE CLEANER TO CLEAN CARBON OUT OF RING GROOVES.



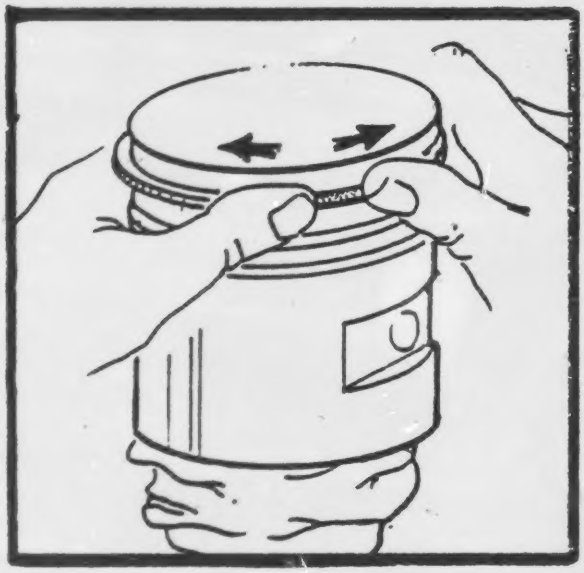
NOTE: IF YOU DON'T HAVE RING GROOVE CLEANER, YOU CAN MAKE IT THIS WAY:

1. BREAK AN OLD RING IN HALF.
2. GRIND ONE END FLAT AND THE OTHER END SHARP.

CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

1. REMOVED BOTH RINGS.
2. CLEANED ALL THE CARBON FROM THE RING GROOVES.

10. GET THE NEW RINGS. SPREAD THEM LIKE YOU DID IN JOB STEPS 6 AND 7.



CAUTION: DO NOT SPREAD THE RING ENDS TOO FAR OR THE RING WILL BREAK.

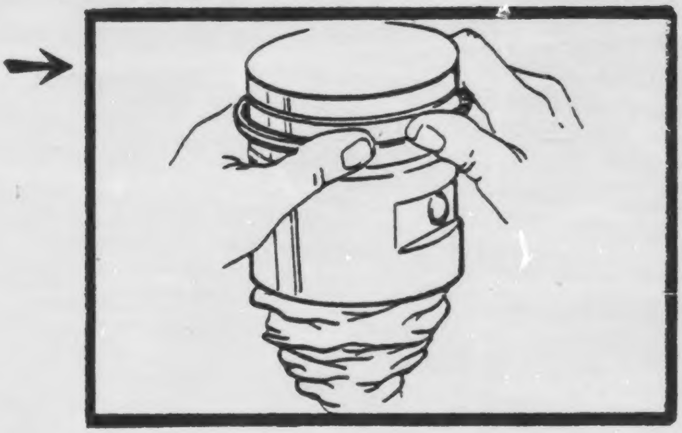
"TURN THE PAGE"

JOB STEPS

READ:

LOOK:

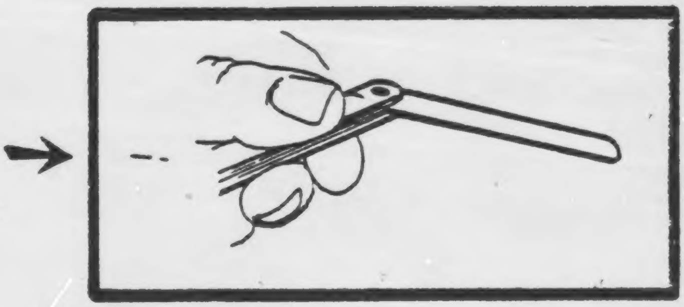
11. NOW SLIP THE SPREAD-OUT RINGS ONTO THE PISTON IN THE GROOVES.



CHECK: ASK YOUR INSTRUCTOR TO LOOK AT YOUR WORK.

12. THE NEXT STEP IS CHECKING RING LAND CLEARANCES AS YOU LEARNED IN MODULE
7501 23 005 1
7501 23 005 3.

13. TAKE YOUR FEELER GAUGE AND OPEN IT TO THE PROPER SETTING.



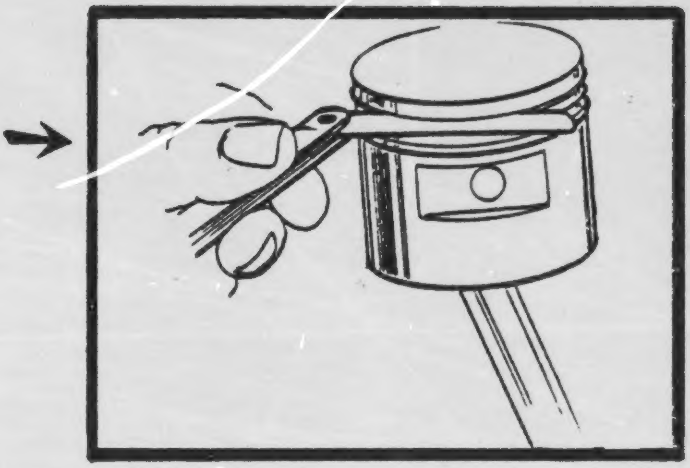
"TURN THE PAGE"

JOB STEPS

READ:

14. PUT THE GAUGE BETWEEN THE RING AND RING LAND AND CHECK THE LAND CLEARANCE. IF THE CLEARANCE IS GREATER THAN WHAT THE MANUAL CALLS FOR, YOU MUST REPLACE THE PISTON.

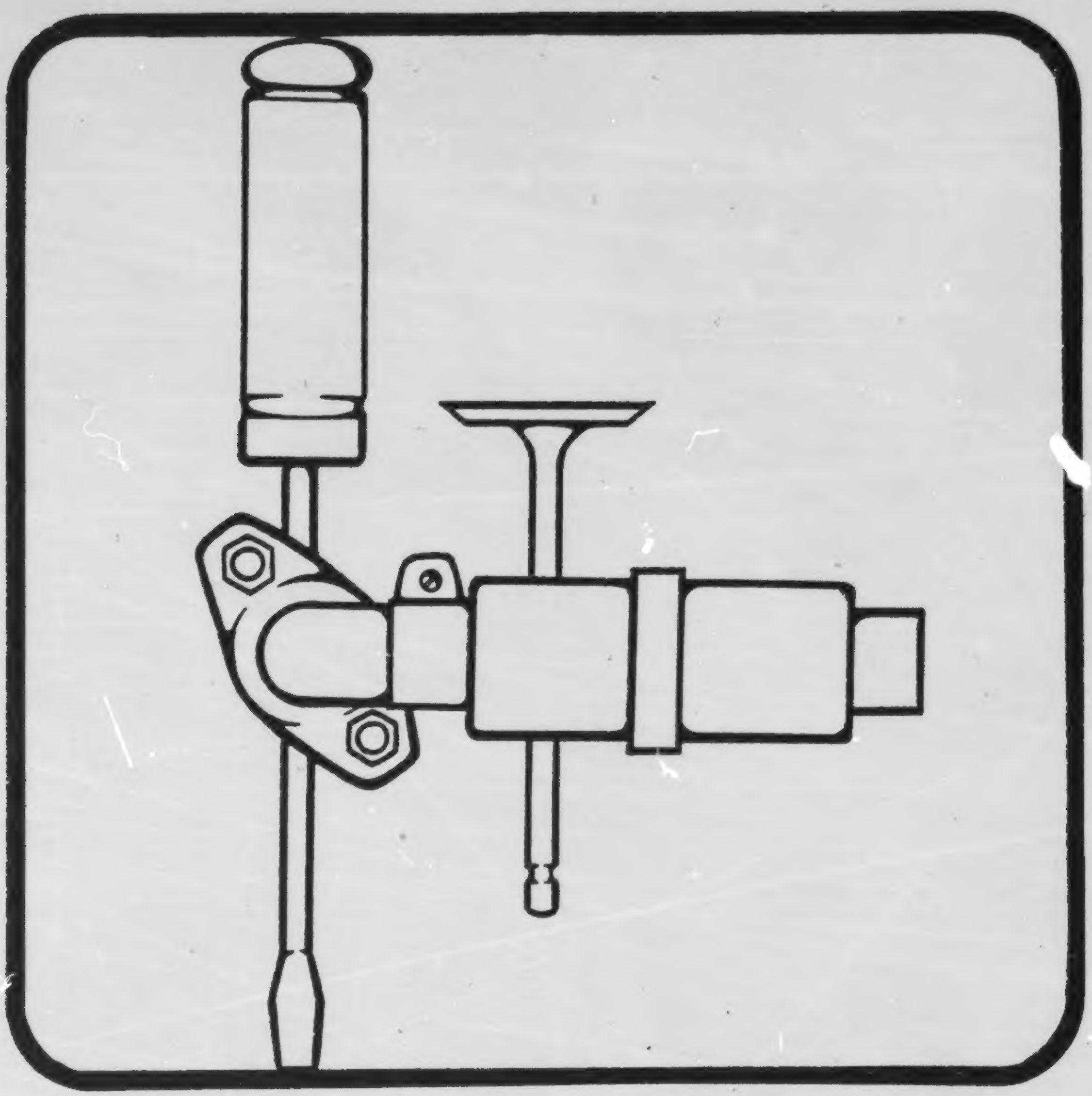
LOOK:



CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

1. USED THE RIGHT FEELER GAUGE SETTING.
2. MEASURED CORRECTLY FOR LAND CLEARANCE.

15. RETURN ALL YOUR EQUIPMENT TO THE CORRECT PLACES.



small engine repair

unit: RING AND PISTON SERVICE

capital area career center

module: 7501 23 002 1
7501 23 002 3 date: OCTOBER 1977 level: I

skill title: HOW TO INSTALL PISTON RINGS ON THE PISTON IN THE CORRECT ORDER

developed & written by: DON FOSTER

visuals by: DAVE WEHRWEIN

WORD GUIDE

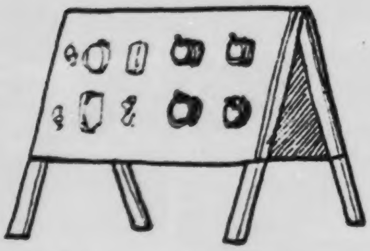
CORRECTLY - RIGHT, PROPERLY

PERFORMANCE OBJECTIVE

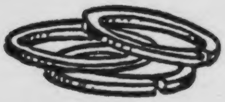
YOU ARE GOING TO LEARN:

HOW TO CORRECTLY PUT PISTON RINGS ON THE PISTON.

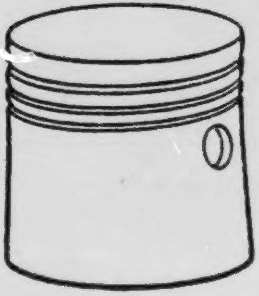
AND IN ORDER TO DO THIS YOU WILL NEED:



RING DISPLAY



SET OF RINGS



PISTON

WE WILL KNOW YOU CAN DO IT WHEN:

1. YOU HAVE ALL EQUIPMENT.
2. YOU HAVE PUT PISTON RINGS ON THE PISTON IN THE RIGHT WAY.

"TURN THE PAGE"

WORD GUIDE

GROOVE - NOTCH

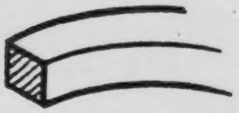
GROOVELESS - WITHOUT ANY GROOVES

BEVEL - SLANTED SURFACE

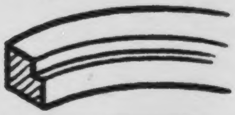
INFORMATION

MOST PISTONS HAVE THREE KINDS OF RINGS: A COMPRESSION RING, AN OIL SCRAPER RING, AND AN OIL RING.

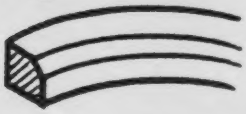
THE COMPRESSION RING GOES INTO THE TOP RING GROOVE ON THE PISTON. THERE ARE DIFFERENT TYPES OF COMPRESSION RINGS. HERE ARE THREE COMMON TYPES:



GROOVELESS RINGS MAY BE PUT IN WITH EITHER SIDE UP.

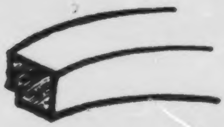


COMPRESSION RINGS WITH GROOVES MUST BE PUT IN WITH THE GROOVE TOWARD THE TOP OF THE PISTON.

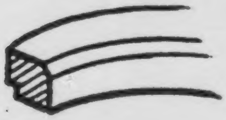


COMPRESSION RINGS WITH BEVELS MUST BE PUT IN WITH THE BEVEL UP, TOWARD THE TOP OF THE PISTON.

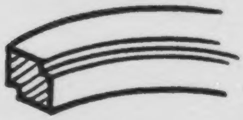
THE SECOND KIND OF RING, THE OIL SCRAPER RING, GOES IN THE CENTER RING GROOVE ON THE PISTON. THE OIL SCRAPER RING HAS A GROOVE IN THE OUTSIDE OF THE RING AND MUST BE PUT IN WITH THE GROOVE DOWN. HERE ARE THREE COMMON TYPES:



OIL SCRAPER RING (NOTE: GROOVE ON OUTSIDE OF RING) THIS RING MUST BE PUT IN WITH OUTSIDE GROOVE TOWARD BOTTOM OF PISTON.

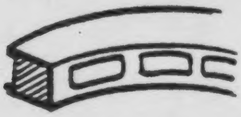


OIL SCRAPER RING (NOTE: GROOVE ON OUTSIDE AND BEVEL ON INSIDE.) BEVEL GOES UP; GROOVE GOES DOWN.



OIL SCRAPER RING (NOTE: GROOVE ON OUTSIDE AND GROOVE INSIDE.) INSIDE GROOVE GOES UP; OUTSIDE GROOVE GOES DOWN.

THE THIRD KIND OF RING IS THE OIL RING. THIS RING GOES IN THE BOTTOM RING GROOVE ON THE PISTON. THERE IS ONE COMMON TYPE:



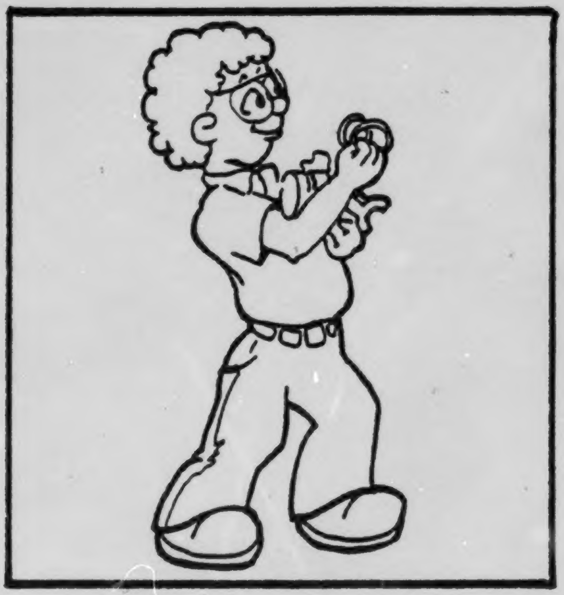
OIL RING - RING CAN BE PUT IN EITHER WAY.

"TURN THE PAGE"

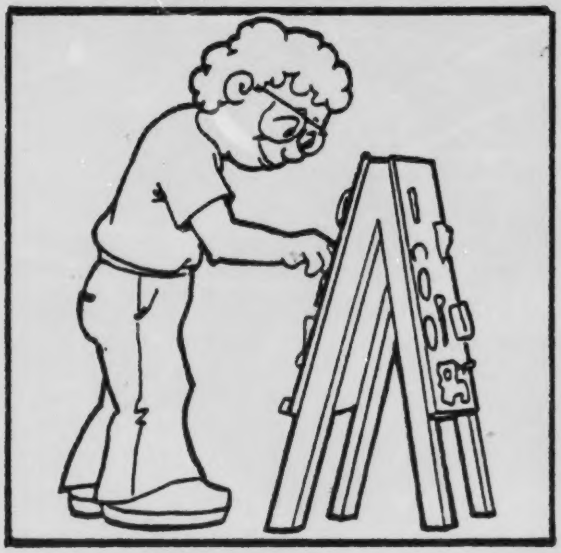
JOB STEPS

READ: LOOK:

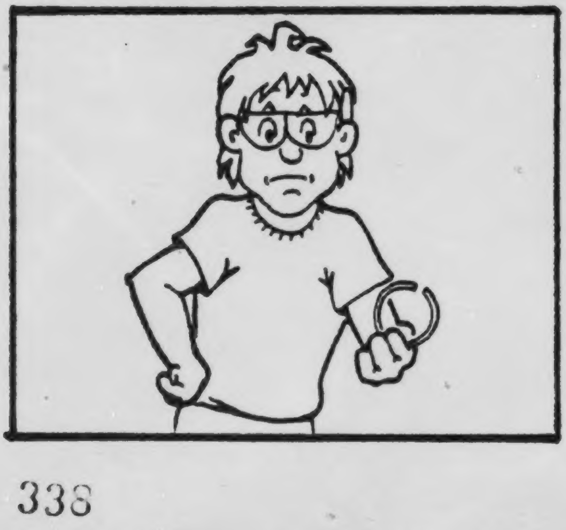
1. GET YOUR EQUIPMENT AND TAKE IT TO YOUR WORK AREA. →



2. GET RING DISPLAY FROM A-FRAME DISPLAY BOARD. →



3. STUDY THE RINGS. →

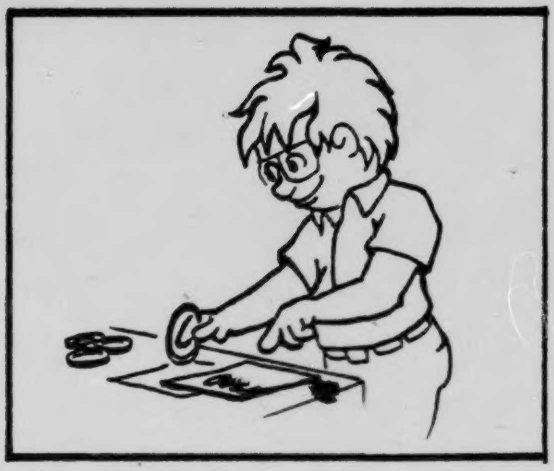


"TURN THE PAGE"

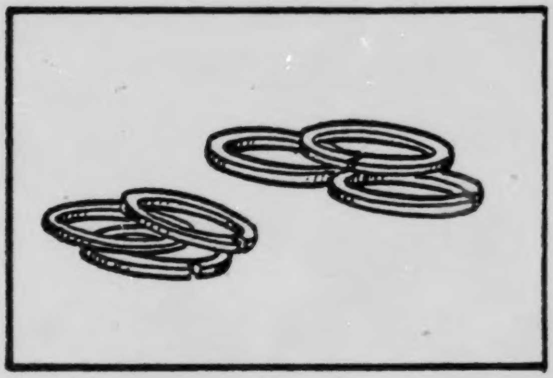
READ:

LOOK:

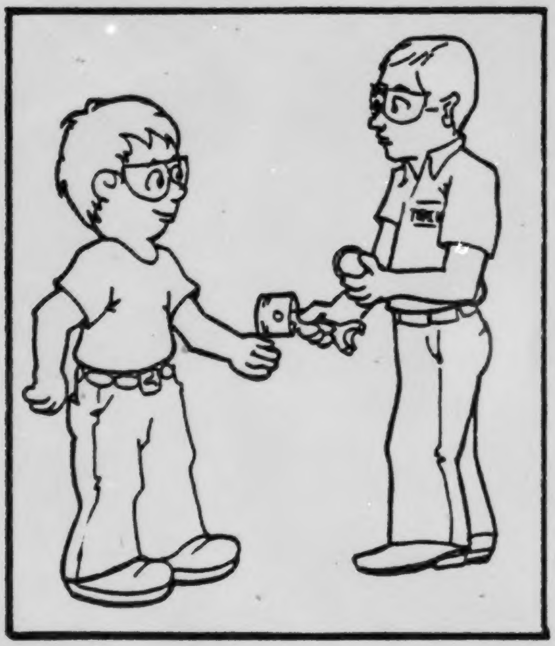
4. LOOK AT DRAWINGS OF EACH RING ON THE INFORMATION PAGES. MATCH THE DISPLAY RINGS WITH THE DRAWINGS.



5. PUT COMPRESSION RINGS IN ONE PILE AND OIL SCRAPER RINGS IN ANOTHER PILE. SHOW YOUR INSTRUCTOR.



6. ASK INSTRUCTOR FOR A SET OF RINGS AND A PISTON.



"TURN THE PAGE"

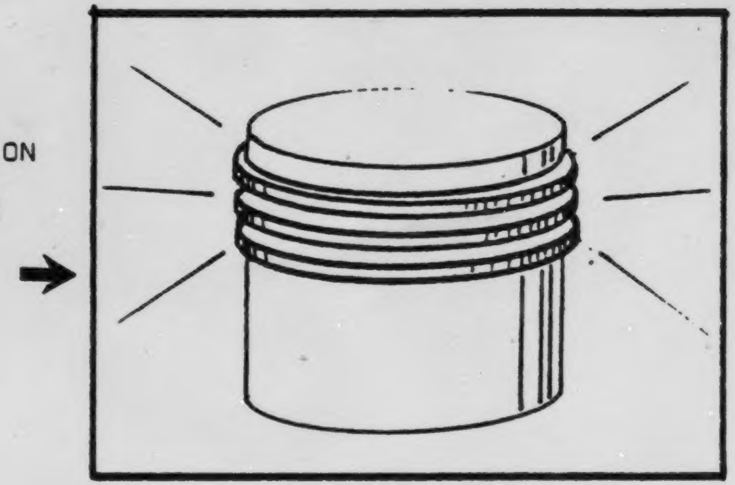
JOB STEPS

READ: LOOK:

CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

1. ALL EQUIPMENT.
2. DISPLAY RINGS.
3. MATCHED DISPLAY RINGS TO DRAWINGS ON INFORMATION PAGE (3).

7. PUT RINGS ON THE PISTON IN THE RIGHT ORDER. (SEE INFORMATION PAGE) MAKE SURE RINGS ARE PUT IN WITH THE CORRECT SIDE UP, ON THE PISTON.



CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

1. SEPARATED COMPRESSION RINGS FROM OIL SCRAPER RINGS.
2. A SET OF RINGS AND A PISTON.
3. PUT RINGS ON THE PISTON IN THE RIGHT WAY.

small engine repair

unit: RING SERVICE

capital area career center

module: 7501 23 003 1
7501 23 003 3 **date:** SEPT 77 **level:**

skill title: DEGLAZE CYLINDERS AND CHECK END GAP

developed & written by: D. CONSTANTINI

visuals by: DAVE WEHRWEIN

WORD GUIDE

DEGLAZE - TO REMOVE THE COATING

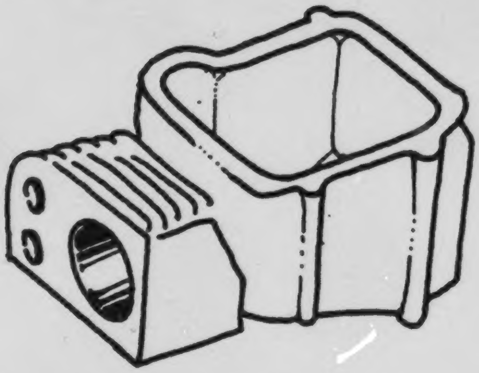
GLAZE - SMOOTH, SHINY SURFACE

PERFORMANCE OBJECTIVE

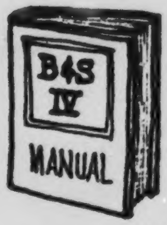
YOU ARE GOING TO LEARN:

1. HOW TO DEGLAZE A CYLINDER ON AN ENGINE.
2. HOW TO CHECK THE PISTON RING END GAP.

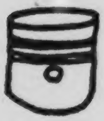
AND IN ORDER TO DO THIS YOU WILL NEED:



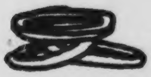
CYLINDER WITH PISTON REMOVED



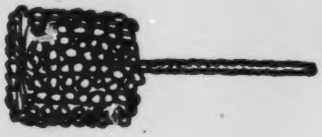
B & S REPAIR MANUAL NO. IV



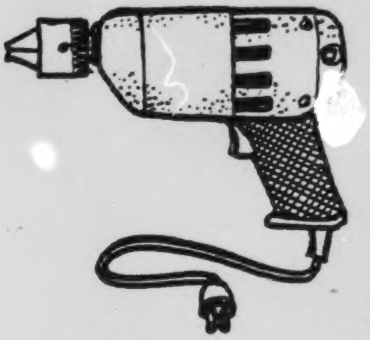
PISTON



SET OF RINGS



DEGLAZING HONE



ELECTRIC DRILL MOTOR

LUBRICANT

SAFETY GLASSES

"TURN THE PAGE"

WE WILL KNOW YOU CAN DO IT WHEN:

1. YOU HAVE ALL YOUR EQUIPMENT.
2. YOU DEGLAZE A CYLINDER SO THAT YOU HAVE NOT LEFT ANY VARNISH OR GLAZE.
3. YOU CAN ANSWER THE QUESTIONS ABOUT DEGLAZING CYLINDERS.
4. YOU HAVE PUT IN PISTON AND RINGS.
5. YOU HAVE FOUND OUT THE SIZE OF THE PISTON RING END GAP.
6. YOU HAVE WORN YOUR SAFETY GLASSES FOR EACH STEP OF THIS MODULE.

"TURN THE PAGE"

WORD GUIDE

CLEARANCE - DISTANCE BETWEEN TWO PLUGS OR POINTS

MINIMUM - LOWEST POSSIBLE AMOUNT

SEAL - SOMETHING WHICH CLOSES TIGHTLY

INFORMATION

A CYLINDER THAT NEEDS BLAZING WILL LOOK SHINY. CYLINDERS SHOULD BE DEGLAZED SO THAT THE GLAZE IS BROKEN. IF A GLAZE STAYS ON A CYLINDER WALL, NEW PISTON RINGS WILL NOT WORK RIGHT AND THE ENGINE WILL USE A LOT OF OIL. THIS HAPPENS A LOT ON CAST-IRON OR STEEL-SLEEVE CYLINDERS.

IF YOU ARE USING CHROME RINGS, YOU DO NOT DEGLAZE THE CYLINDER. YOU ALSO DON'T HAVE TO DEGLAZE CYLINDERS ON AN ALUMINUM ENGINE, BUT IT WILL HELP THE RINGS TO SEAT IF YOU DO.

SOME ALUMINUM ENGINES HAVE STEEL SLEEVES ON THE CYLINDERS. IN ORDER TO TELL IF THE ENGINE HAS STEEL SLEEVES, CLEAN OFF THE TOP OF THE ENGINE BLOCK. IF THERE IS A DARK RING AROUND EACH CYLINDER, THERE IS A STEEL SLEEVE. IF NOT, IT IS AN ALUMINUM CYLINDER.

TO FIND OUT MORE ABOUT CYLINDERS, READ B & S REPAIR MANUAL IV, SECTION 9, PAGES 1 - 4, AND SECTION 11, PAGES 1 AND 2.

AFTER YOU HAVE READ ABOUT CYLINDERS IN THE B & S MANUAL, CHECK THE END GAP IN THE ENGINE TO BE SURE YOU HAVE JUST ENOUGH ROOM BETWEEN THE ENDS OF THE RINGS. IF THERE IS TOO MUCH ROOM, THE RING WILL GET TOO LARGE AND MAKE A POOR SEAL.

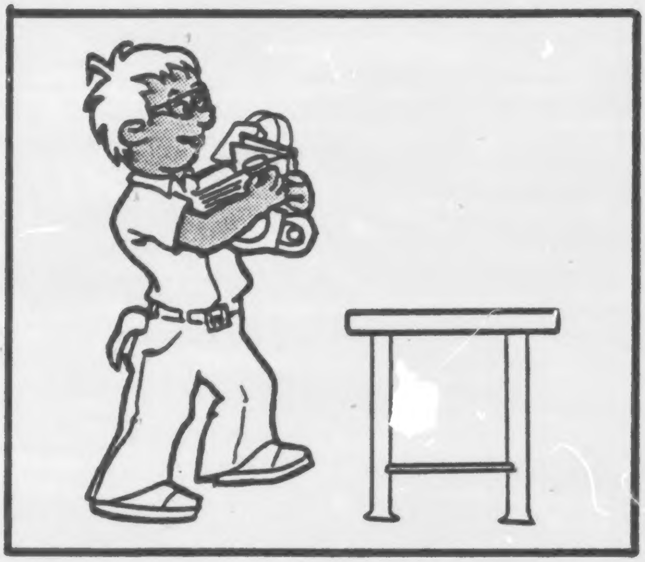
"TURN THE PAGE"

JOB STEPS

READ:

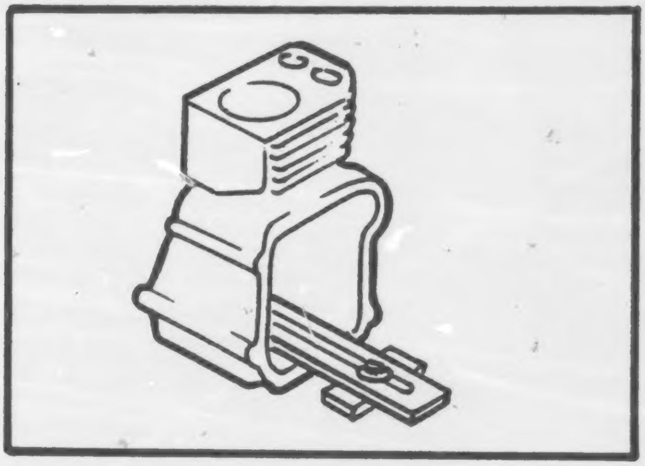
LOOK:

1. GET ALL EQUIPMENT AND TAKE IT TO YOUR WORK AREA.

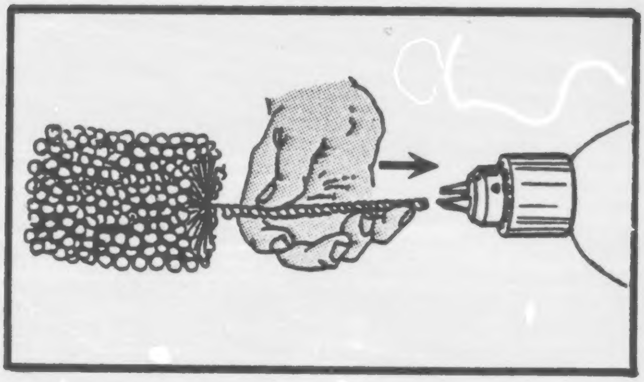


NOTE: BE SURE TO WEAR SAFETY GLASSES WHEN DOING ALL OF THE JOB STEPS

2. CLAMP DOWN BLOCK TO THE BENCH. CLAMP IT WHERE YOU WILL NOT CRACK THE BLOCK.



3. PUT DEGLAZING HONE INTO THE CHUCK OF THE 3/8" DRILL. DO NOT PLUG IN.



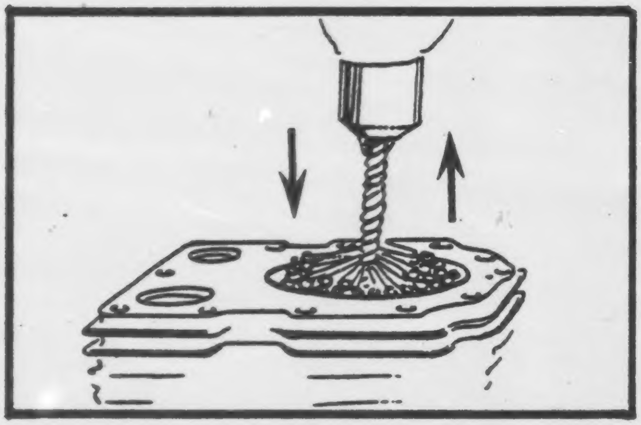
"TURN THE PAGE"

WORD GUIDE

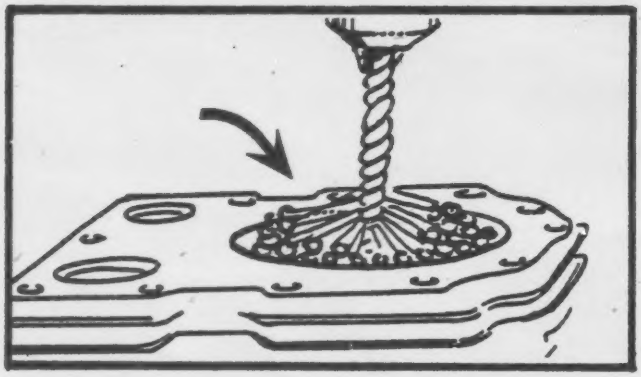
LUBRICATE - TO MAKE SMOOTH OR SLIPPERY

READ:

LOOK:



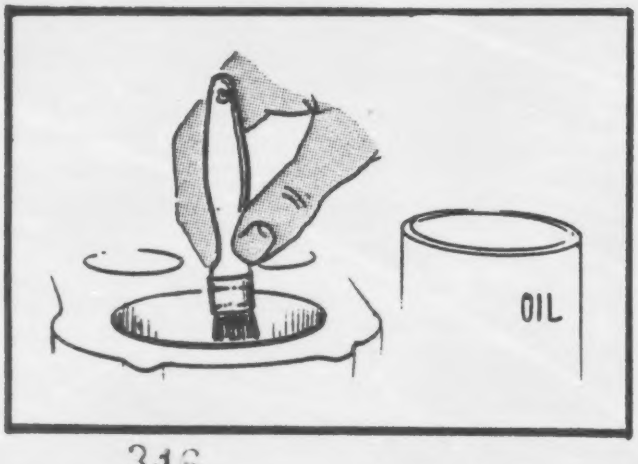
4. PLACE HONE IN CYLINDER AND MOVE HONE UP AND DOWN TWO TIMES.



5. CHECK TO SEE THAT THE STONES DO NOT GO OUT OF CYLINDER MORE THAN 1" AT TOP OR BOTTOM.

CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

1. ALL EQUIPMENT.
2. WORN SAFETY GLASSES.
3. CLAMPED BLOCK TO BENCH WITHOUT CRACKING THE BLOCK.
4. PUT DEGLAZING HONE INTO CHUCK.
5. MOVED HONE IN CYLINDER UP AND DOWN, MAKING SURE NO STONES COME OUT.



6. LUBRICATE CYLINDER. IF CYLINDER IS ALUMINUM, USE LARD OIL LIKE MAZOLA, WESSON, OR CRISCO. IF SLEEVE IS CAST IRON OR STEEL, USE OLEUM, KEROSENE OR THE KIND OF HONING OIL SOLD IN STORES.

"TURN THE PAGE"

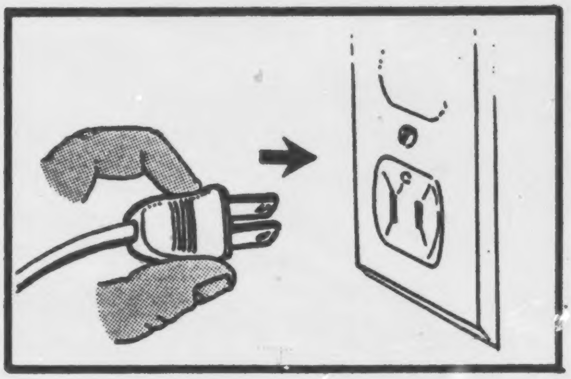
WORD GUIDE

STROKE - A MOVEMENT
CORRECT - THE RIGHT ONE

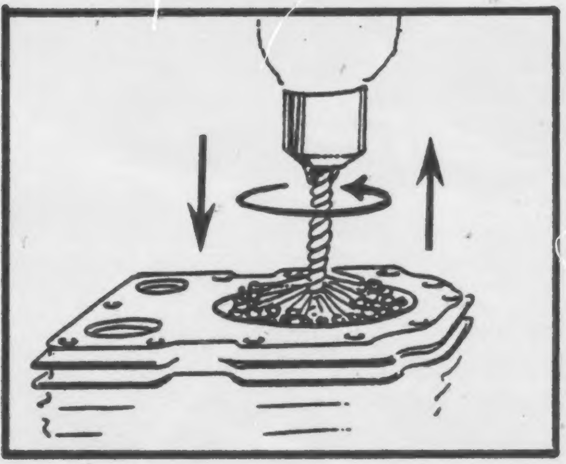
READ:

LOOK:

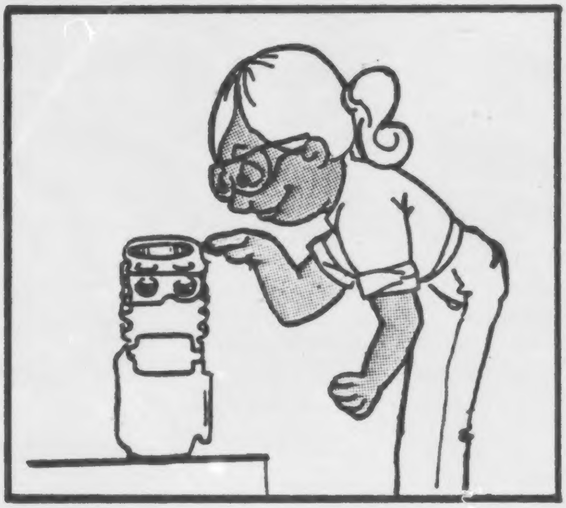
7. MAKE SURE TRIGGER IS NOT LOCKED ON DRILL. PLUG IN DRILL.



8. USE SLOW, UP AND DOWN STROKES TO TURN ON DRILL. HONE SHOULD NOT GO TOO FAR ON DOWN STROKES OR COME OUT TOO FAR ON OUT STROKE.
ASK YOUR INSTRUCTOR TO WATCH YOU DO THIS. REMEMBER! WORK SAFELY AND CAREFULLY!!



9. CHECK CYLINDER MANY TIMES, UNTIL MOST OF GLAZE IS GONE. REMEMBER: SHUT OFF DRILL BEFORE TAKING OUT HONE FROM CYLINDER



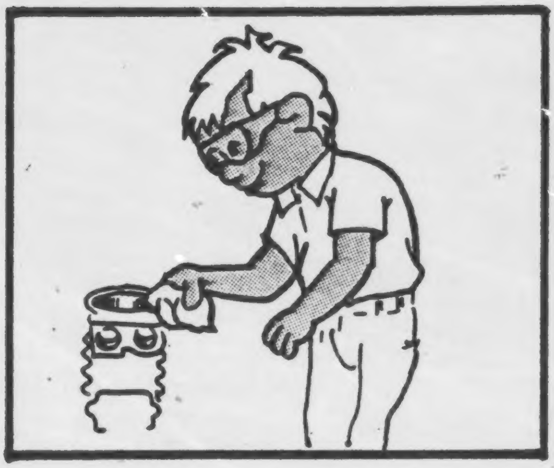
"TURN THE PAGE"

READ:

10. WHEN MOST OF GLAZE IS GONE, USE OLEUM OR SOAP AND WATER TO CLEAN BLOCK AND CYLINDER.

NOTE: CYLINDER MUST BE FULLY CLEANED OF DIRT.

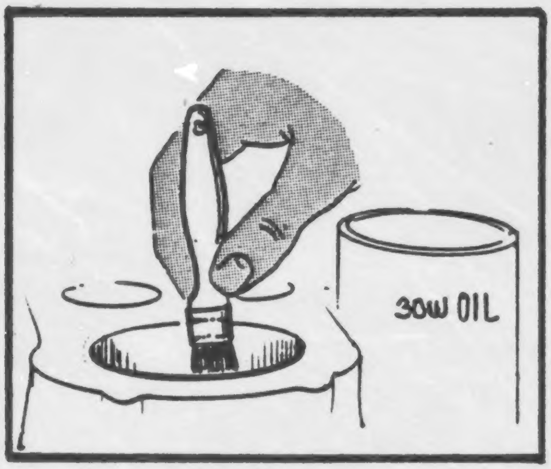
LOOK:



CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

1. LUBRICATED CYLINDER WITH CORRECT OIL.
2. CHECKED TRIGGER ON DRILL AND PLUGGED IT IN.
3. CORRECTLY USED THE DRILL BY USING SLOW, UP AND DOWN STROKES.
4. MADE SURE HONE IS NOT TOO FAR DOWN OR TOO FAR OUT.
5. MADE SURE MOST OF GLAZE IS GONE.
6. SHUT OFF DRILL BEFORE TAKING OUT HONE.

11. IF YOU USE SOAP AND WATER TO CLEAN CYLINDER, DRY IT OFF. THEN, TO STOP RUST, OIL CYLINDER WITH A LOT OF 30W CYLINDER OIL.

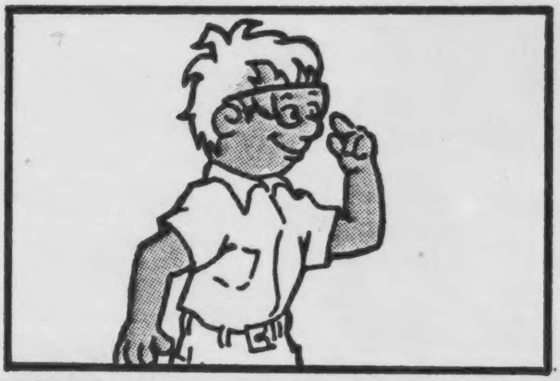


"TURN THE PAGE"

WORD GUIDE

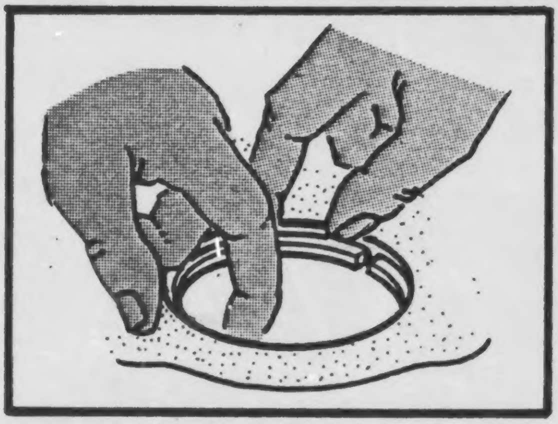
DIAMETER - DISTANCE OF STRAIGHT LINE FROM END TO END, THROUGH CENTER OF A CIRCLE

READ: LOOK:

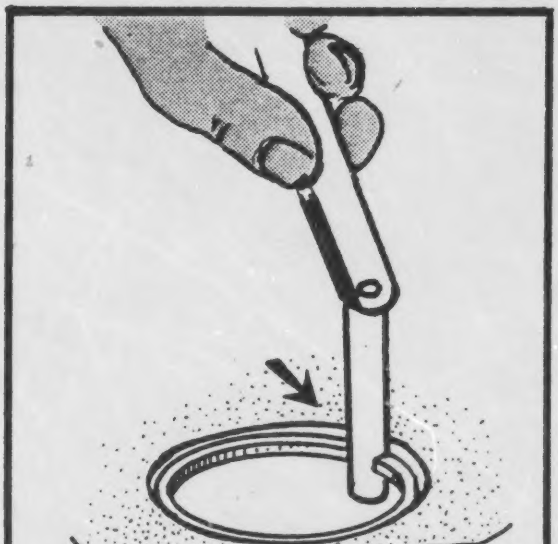


12. SHOW CYLINDER TO INSTRUCTOR. HE/SHE WILL ASK YOU QUESTIONS.

NOTE: IF YOU DO NOT WEAR SAFETY GLASSES WHEN YOU TAKE CYLINDER TO INSTRUCTOR, YOU WILL HAVE TO DO THIS MOD AGAIN.



13. PUT RINGS IN CYLINDER. PUSH DOWN RINGS INTO CYLINDER TO THE BOTTOM OF RING TRAVEL.



14. CHECK RING END GAP. LOOK UP INFORMATION ON RING GAP IN THE MANUAL. IF YOU CANNOT FIND A MANUAL, FIGURE .003 MINIMUM END-GAP PER INCH OF DIAMETER OF RING SAMPLE.

EXAMPLE:

2 INCH RING = .006 GAP
2 1/2 INCH RING = .009 GAP
3 INCH RING = .009 GAP

"TURN THE PAGE"

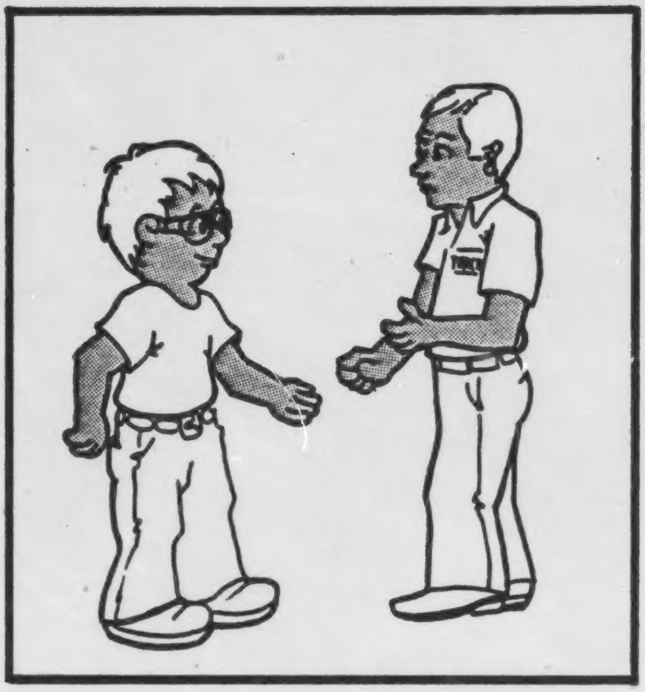
JOB STEPS

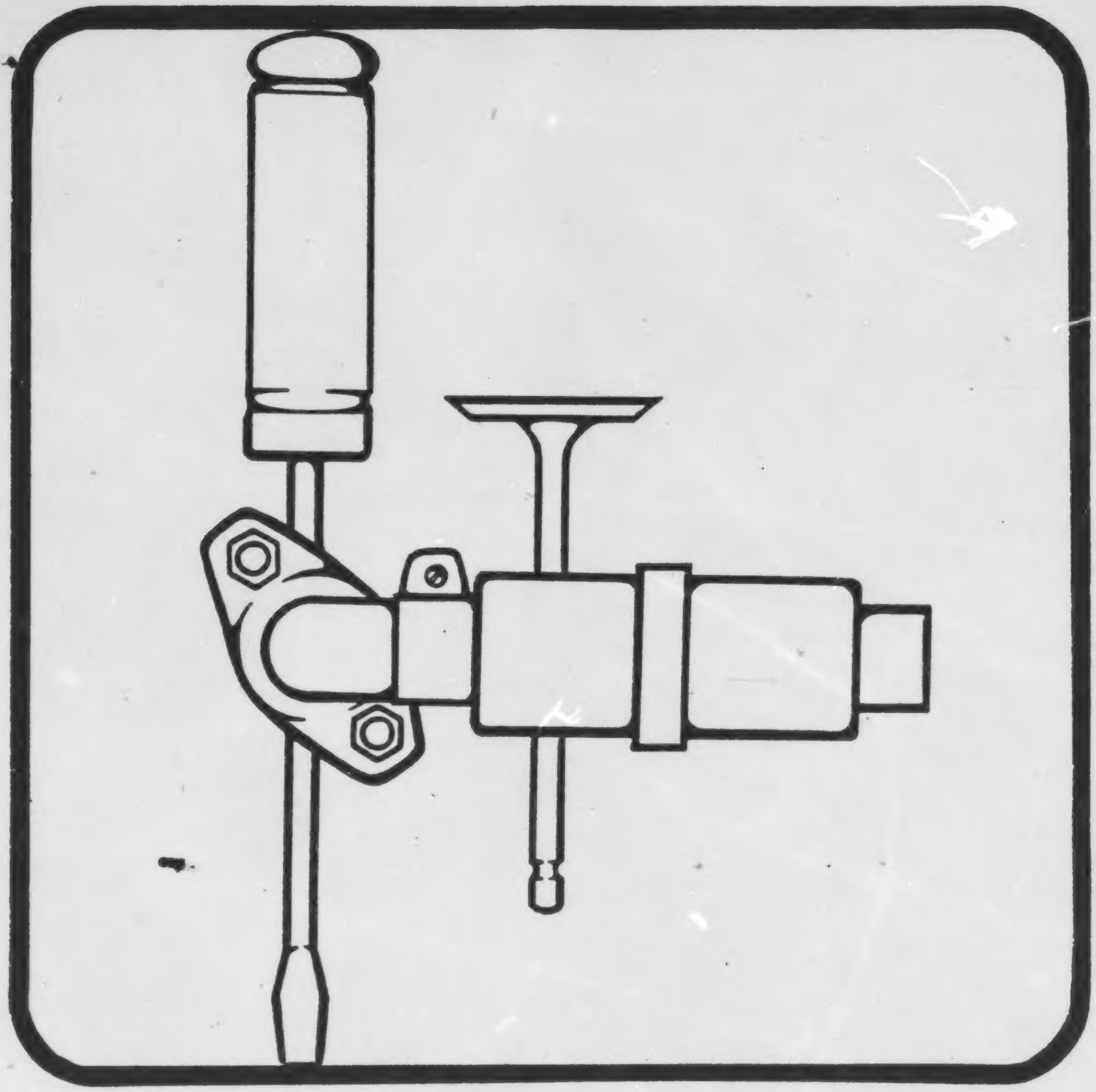
READ: LOOK:

CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

1. FULLY CLEANED BLOCK AND CYLINDER.
2. DRIED OFF CYLINDER THAT WAS CLEANED WITH SOAP AND WATER, AND THEN OILED IT.
3. PUSHED RINGS DOWN TO BOTTOM OF RING TRAVEL IN CYLINDER.
4. CHECKED RING END GAP.

15. SHOW INSTRUCTOR THE END GAP. IF IT IS NOT RIGHT, THE INSTRUCTOR WILL HELP YOU.





small engine repair

unit: RINGS

capital area career center

module: 7501 23 004 1
7501 23 004 3 **date:** MARCH 1977 **level:** I

skill title: USING A PISTON RING COMPRESSOR AND SPACING THE RING END GAPS

developed & written by: DON FOSTER

visuals by: DAVE WEHRWEIN

WORD GUIDE

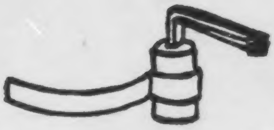
STAGGERED - UNEVEN

PERFORMANCE OBJECTIVE

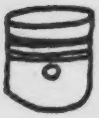
YOU ARE GOING TO LEARN:

HOW TO USE A PISTON RING COMPRESSOR AND TO SPACE THE RING ENDS ON A PISTON.

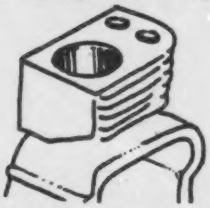
IN ORDER TO DO THIS YOU WILL NEED:



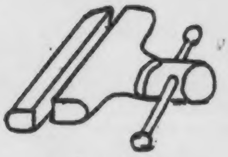
A RING COMPRESSOR



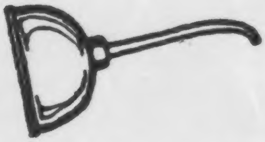
A PISTON WITH RINGS



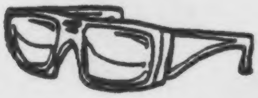
AN ENGINE BLOCK



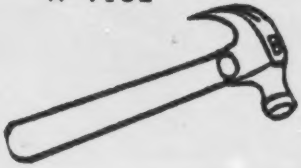
A VISE



AN OIL CAN



SAFETY GLASSES



A HAMMER WITH A WOODEN HANDLE

WE WILL KNOW YOU CAN DO IT WHEN:

YOU HAVE ALL YOUR EQUIPMENT.

PUT THE RINGS ON THE PISTONS WITH THE RING ENDS STAGGERED.

PUT A PISTON WITH RINGS ON IT INTO THE CYLINDER OF AN ENGINE BLOCK.

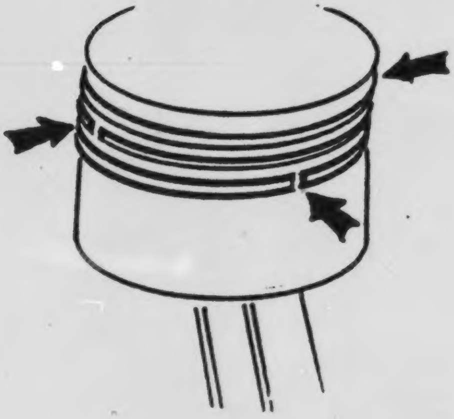
"TURN THE PAGE"

WORD GUIDE

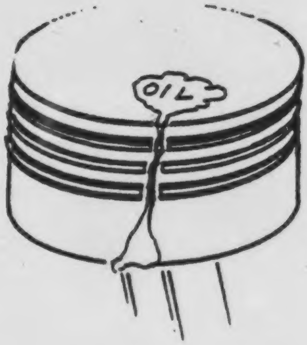
COMPRESSION - PRESSURE IN THE ENGINE TO GIVE IT POWER

INFORMATION

IT IS IMPORTANT TO KNOW THAT THERE WILL BE OPENINGS (GAPS) AT THE ENDS OF A RING AFTER IT GOES AROUND A PISTON. THESE OPENINGS MUST NOT BE LINED UP BEFORE YOU PUT THE RING COMPRESSOR ON THE PISTON. THE RING ENDS MUST BE STAGGERED TO LOOK LIKE THIS:



IF THE RING ENDS ARE IN LINE, THEY WILL LEAK COMPRESSION. THIS MEANS THAT THE ENGINE MIGHT NOT RUN OR IT WON'T HAVE POWER. YOU ALSO WILL LOSE OIL OR BURN A LOT OF IT BECAUSE IT "BLOWS BY" THE RINGS AS SHOWN:



"TURN THE PAGE"

JOB STEPS

READ:

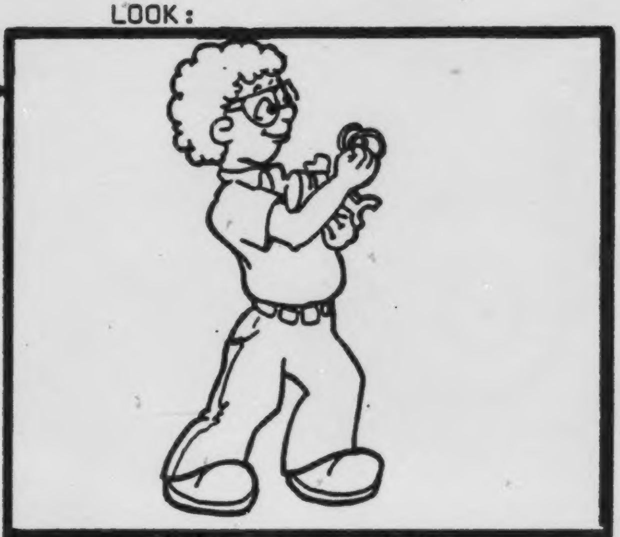
1. GET ALL YOUR EQUIPMENT AND GO TO THE WORK AREA.

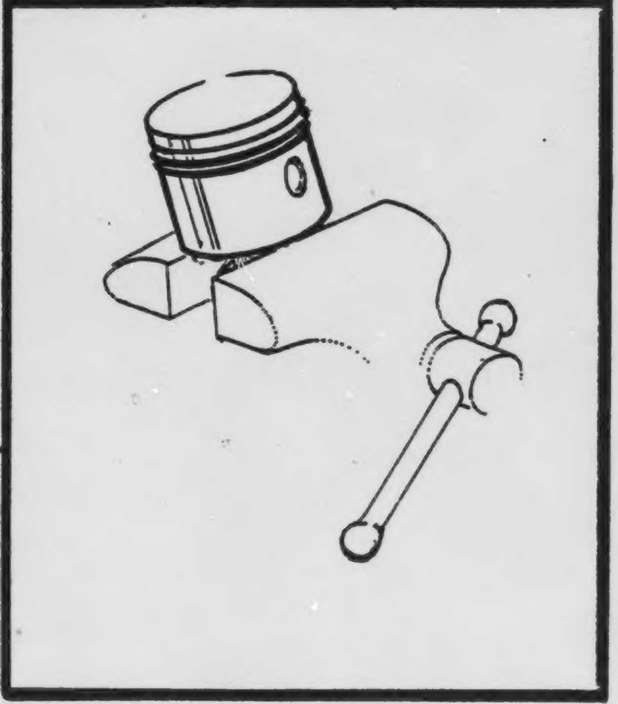
2. PUT ON YOUR SAFETY GLASSES.

3. HOOK YOUR VISE TO YOUR WORK TABLE.

4. PUT THE ROD AND PISTON IN THE VISE AND CLAMP THE ROD VERY LIGHTLY.

LOOK:





CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

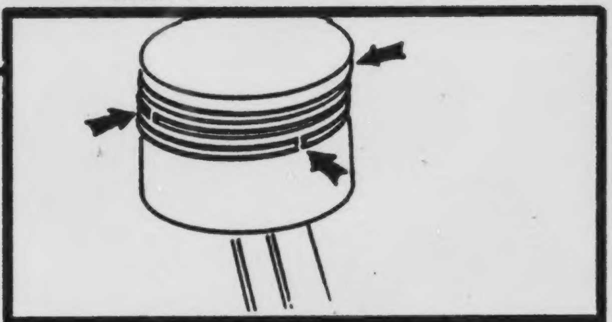
1. ALL YOUR EQUIPMENT.
2. VISE SAFELY ON THE TABLE.
3. THE ROD AND PISTON IN THE VISE IN THE RIGHT WAY.

"TURN THE PAGE"

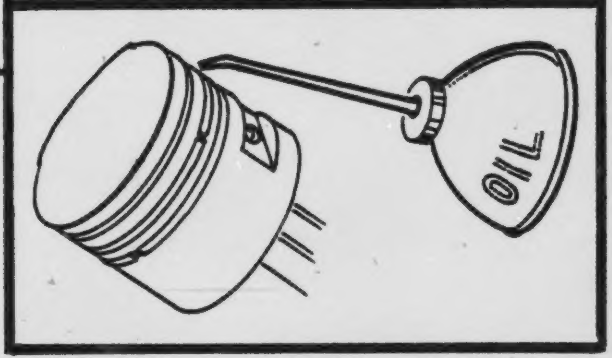
JOB STEPS

READ: LOOK:

5. REMEMBER HOW THE RINGS LOOK ON PAGE 2. MAKE THE RING END GAPS UNEVEN, THE WAY THEY WERE IN THE PICTURE.



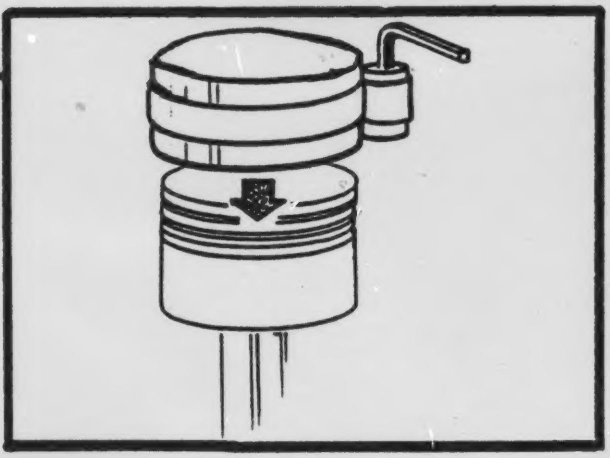
6. LIGHTLY COVER THE PISTON AND RINGS WITH OIL.



CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

1. MADE THE RING END GAPS UNEVEN.
2. PUT A SMALL AMOUNT OF OIL ON THE PISTON AND THE RINGS.

7. TURN THE HANDLE OF YOUR RING COMPRESSOR TO YOUR LEFT. THIS WILL OPEN THE COMPRESSOR.



"TURN THE PAGE"

JOB STEPS

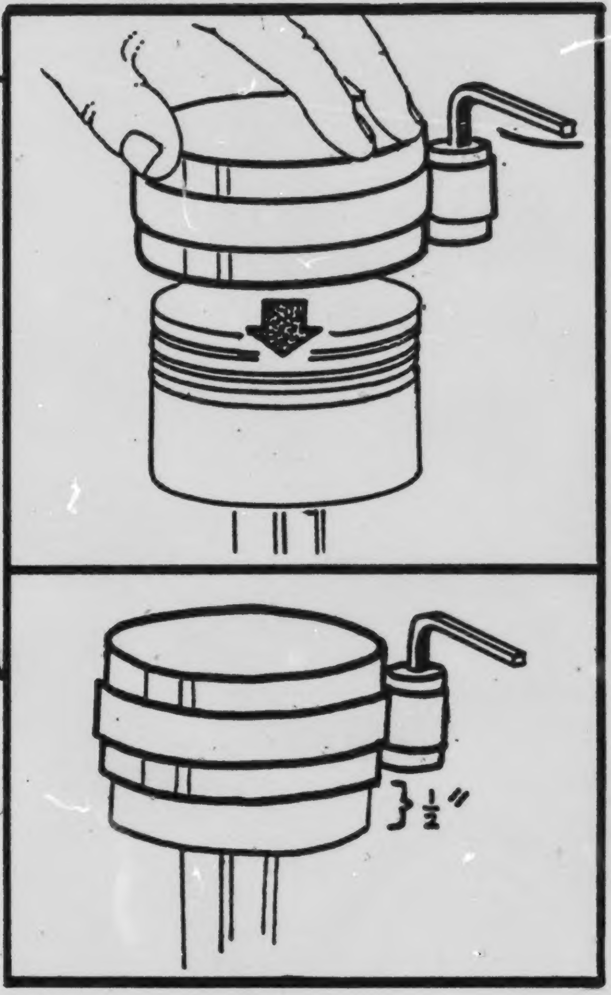
READ:

8. WHEN YOU'VE OPENED THE COMPRESSOR ENOUGH, SLIDE IT OVER THE PISTON AND THE RINGS.

9. SLIDE THE RING COMPRESSOR DOWN THE PISTON UNTIL YOU ARE ABOUT 1/2 INCH FROM THE BOTTOM OF THE PISTON.

10. TIGHTEN THE COMPRESSOR WITH THE HANDLE BY TURNING IT TO YOUR RIGHT. TIGHTEN IT LIGHTLY.

LOOK:



CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

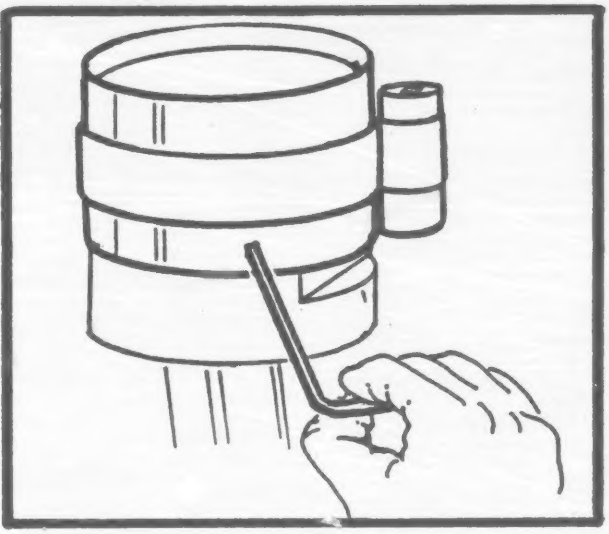
1. PUT THE RING COMPRESSOR ON THE PISTON.
2. LEFT A 1/2 INCH FROM THE BOTTOM OF THE PISTON.
3. TIGHTENED THE COMPRESSOR LIGHTLY.

"TURN THE PAGE"

READ: **JOB STEPS** LOOK:

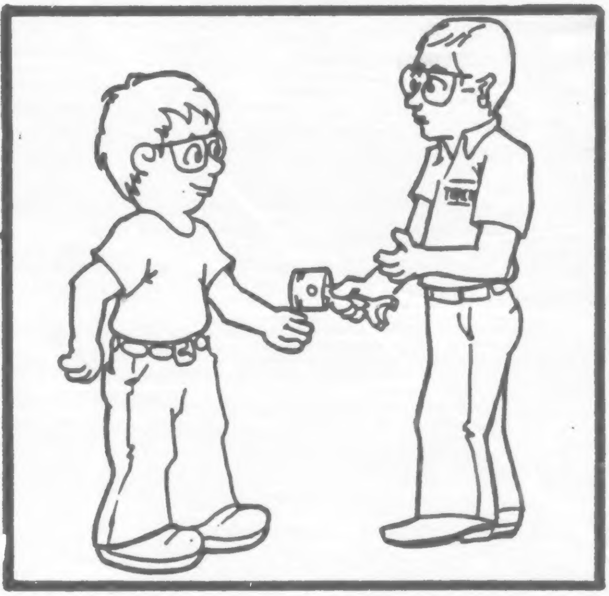
11. LIGHTLY TAP THE SIDE OF THE RING COMPRESSOR.

NOTE: WHAT THIS DOES IS TO PUSH THE RINGS INTO THE GROOVES IN AN EVEN WAY. IT IS CALLED "SEATING" THE RINGS.



12. REMOVE THE PISTON AND THE ROD FROM THE VISE.

13. TAKE IT TO YOUR INSTRUCTOR AND HAVE HIM LOOK AT IT TO MAKE SURE THE RINGS ARE SEATED CORRECTLY IN THE GROOVES OF THE PISTON.



14. PUT THE PISTON AND THE ROD INTO THE CYLINDER.

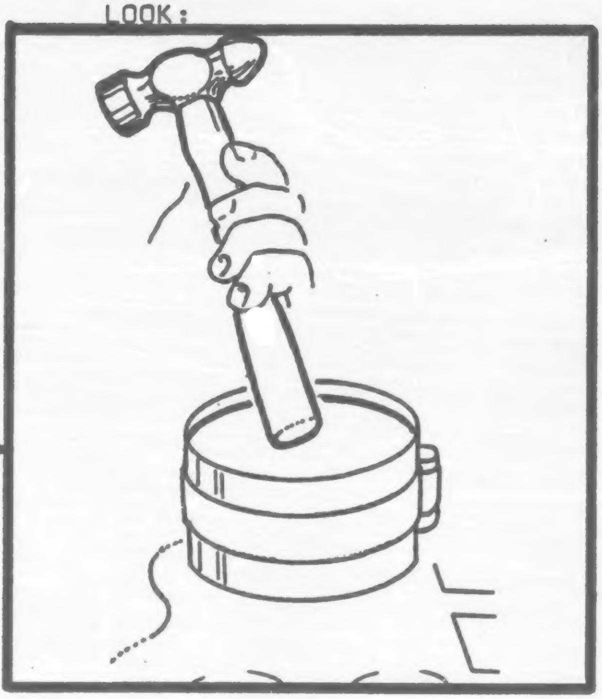
"TURN THE PAGE"

JOB STEPS

READ:

LOOK:

15. GENTLY PUSH DOWN ON THE PISTON UNTIL THE RING COMPRESSOR IS SITTING OR RESTING ON THE TOP OF THE CYLINDER.

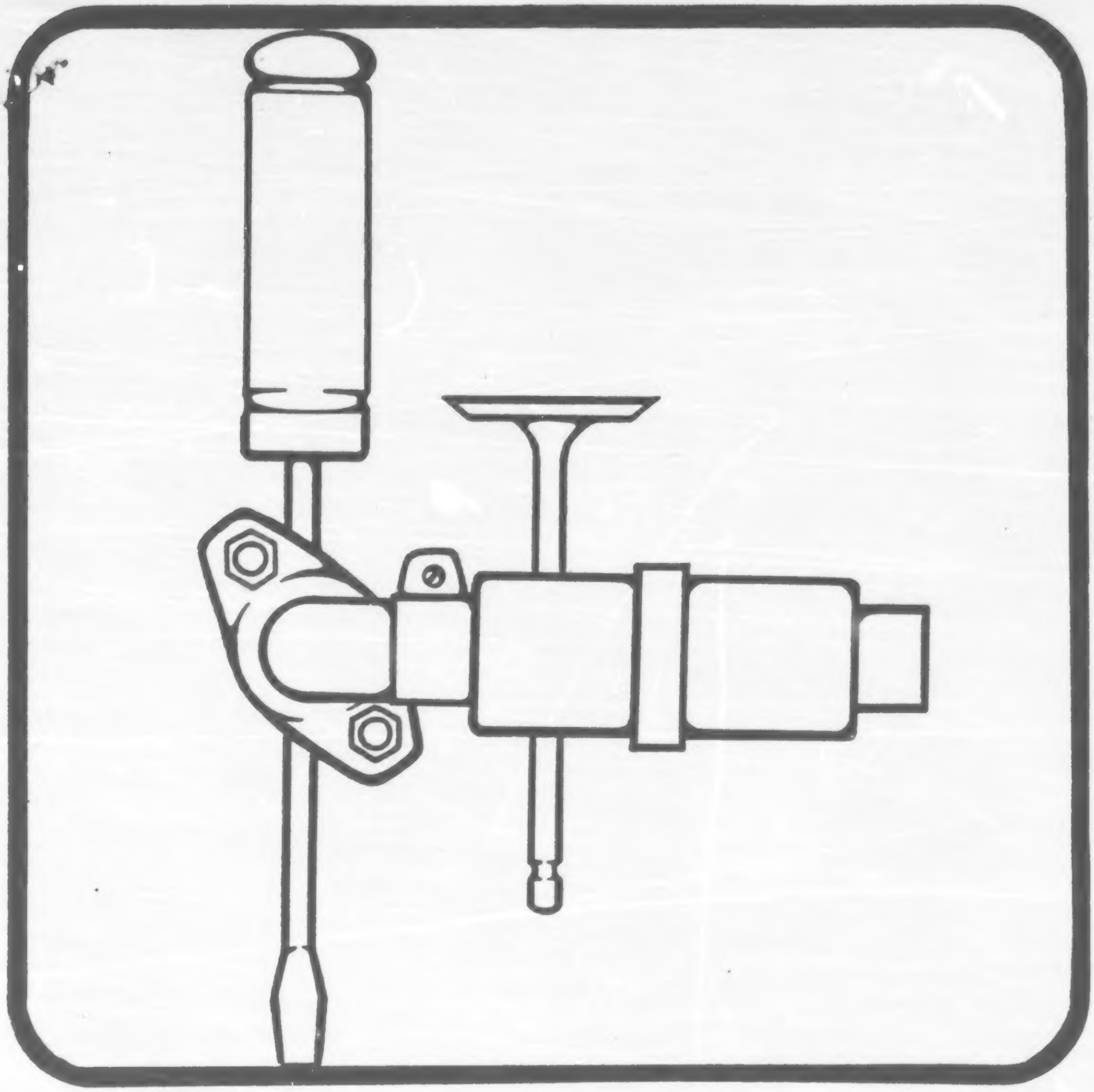


16. USING THE HAMMER WITH THE WOODEN HANDLE, GENTLY TAP THE PISTON DOWN INTO THE CYLINDER UNTIL IT IS FREE OF THE RING COMPRESSOR.

CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

PUT THE PISTON IN THE CYLINDER IN THE RIGHT WAY.

17. PUT ALL YOUR TOOLS AWAY.



small engine repair

unit: RINGS

capital area career center

module: 7501 23 005 1
7501 23 005 3 date: MARCH 1977 level: I

skill title: CHECKING RING LAND CLEARANCE

developed & written by: DON FOSTER

visuals by: DAVE WEHRWEIN

WORD GUIDE

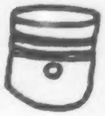
CLEARANCE - SPACE BETWEEN TWO OBJECTS. RING CLEARANCE IS THE AMOUNT OF SPACE BETWEEN A CYLINDER GROOVE AND A RING.

PERFORMANCE OBJECTIVE

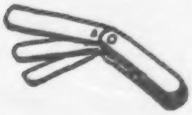
YOU ARE GOING TO LEARN:

HOW TO CHECK RING LAND CLEARANCE.

AND IN ORDER TO DO THIS YOU WILL NEED:



A PISTON WITH RINGS ON IT



A FEELER GAUGE

B&S
IV
MANUAL

BRIGGS AND STRATTON REPAIR MANUAL #4

SAFETY GLASSES

WE WILL KNOW YOU CAN DO IT WHEN:

1. YOU HAVE ALL YOUR EQUIPMENT.
2. YOU HAVE MEASURED THE RING LAND CLEARANCE.
3. YOUR MEASUREMENTS ARE THE SAME AS YOUR INSTRUCTOR'S.

"TURN THE PAGE"

WORD GUIDE

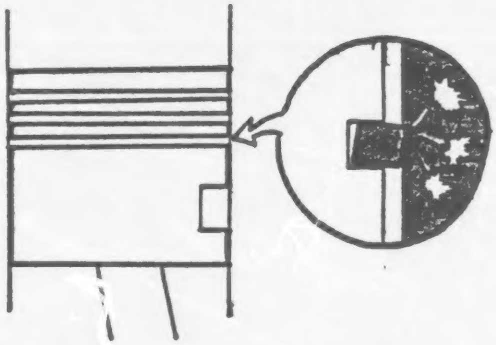
BIND - WEDGE IN, BECOME STUCK.

EXPAND - SPREAD OUT, SPRING OPEN.

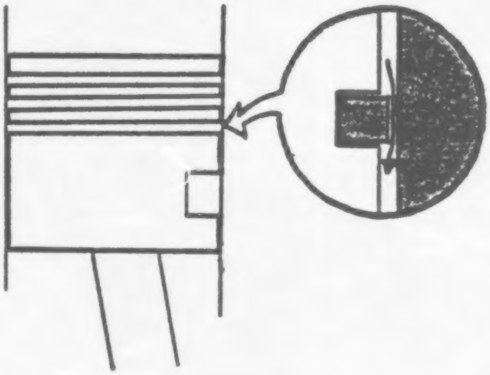
INFORMATION

IN MOST ENGINES THAT RUN ON GASOLINE, THERE ARE PISTONS. THE PISTONS ARE IN A CYLINDER IN THE ENGINE BLOCK, AND MUST FIT WELL. IF THEY DO NOT, THEY WILL NOT PUT OUT THE POWER FOR THE ENGINE TO DO ITS WORK.

IMPORTANT PARTS THAT MAKE IT POSSIBLE FOR THE PISTON TO FIT IN THE CYLINDER ARE RINGS. THE RINGS MUST FIT ON THE PISTON IN A CERTAIN WAY. THE FIT IS CALLED RING LAND CLEARANCE. RING LAND CLEARANCE IS THE AMOUNT OF SPACE BETWEEN A CYLINDER GROOVE AND A PISTON RING INSIDE THE GROOVE. IF THE RING LAND CLEARANCE IS TOO GREAT. THE RINGS COULD BREAK. WHAT HAPPENS IS THAT AS THE PISTON MOVES UP AND DOWN. THE RINGS AROUND IT COULD TWIST AND BREAK.



IF THE RING LAND CLEARANCE IS TOO TIGHT, THE RINGS WILL BIND INTO THE GROOVE AROUND THE PISTON. THIS KEEPS THE RING FROM EXPANDING AGAINST THE CYLINDER. THIS CAUSES COMPRESSION LOSS, AND THUS POWER LOSS.



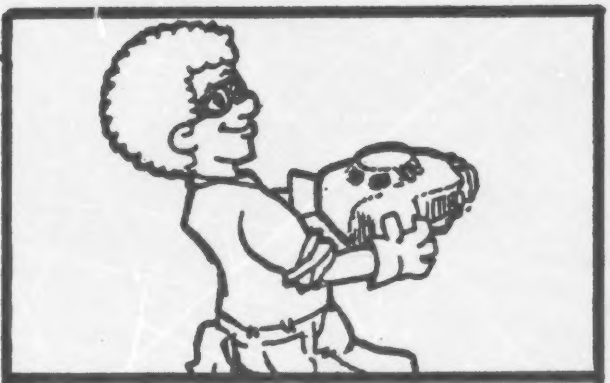
"TURN THE PAGE"

JOB STEPS

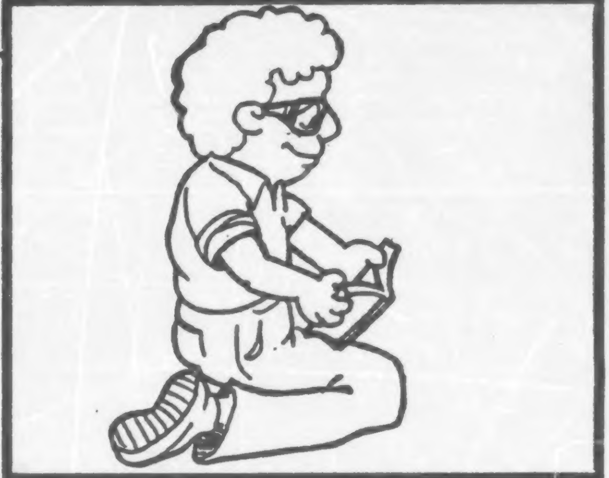
READ:

LOOK:

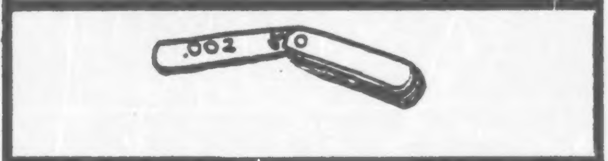
1. GET ALL YOUR EQUIPMENT AND GO TO YOUR WORK AREA.



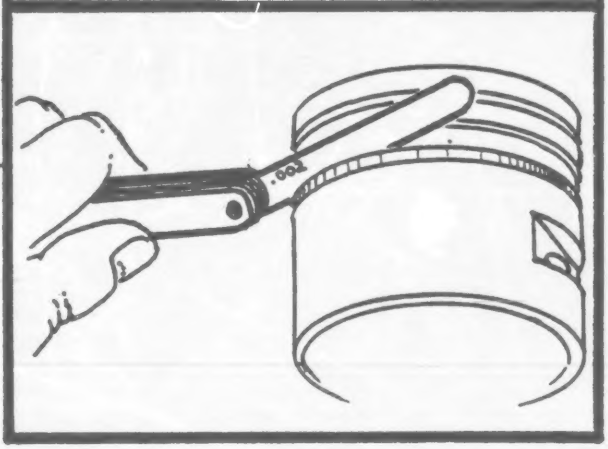
2. IN YOUR BRIGGS AND STRATTON REPAIR MANUAL NO. 4, TURN TO SECTION 9, PAGE 2. READ THE PART DEALING WITH MEASURING RING GROOVES.



3. TAKE YOUR FEELER GAUGE AND PULL OUT THE .002 FEELER.



4. PUT IT BETWEEN THE PISTON RING AND THE RING LAND.



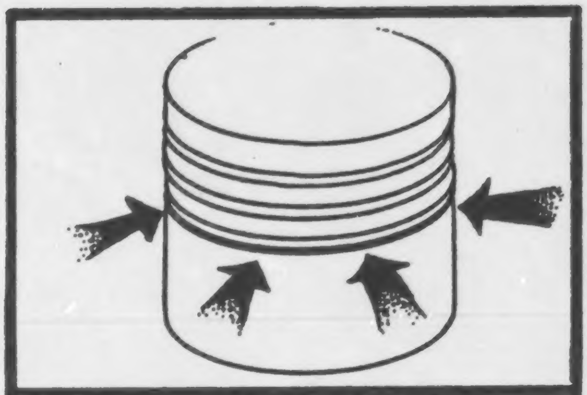
"TURN THE PAGE"

JOB STEPS

READ:

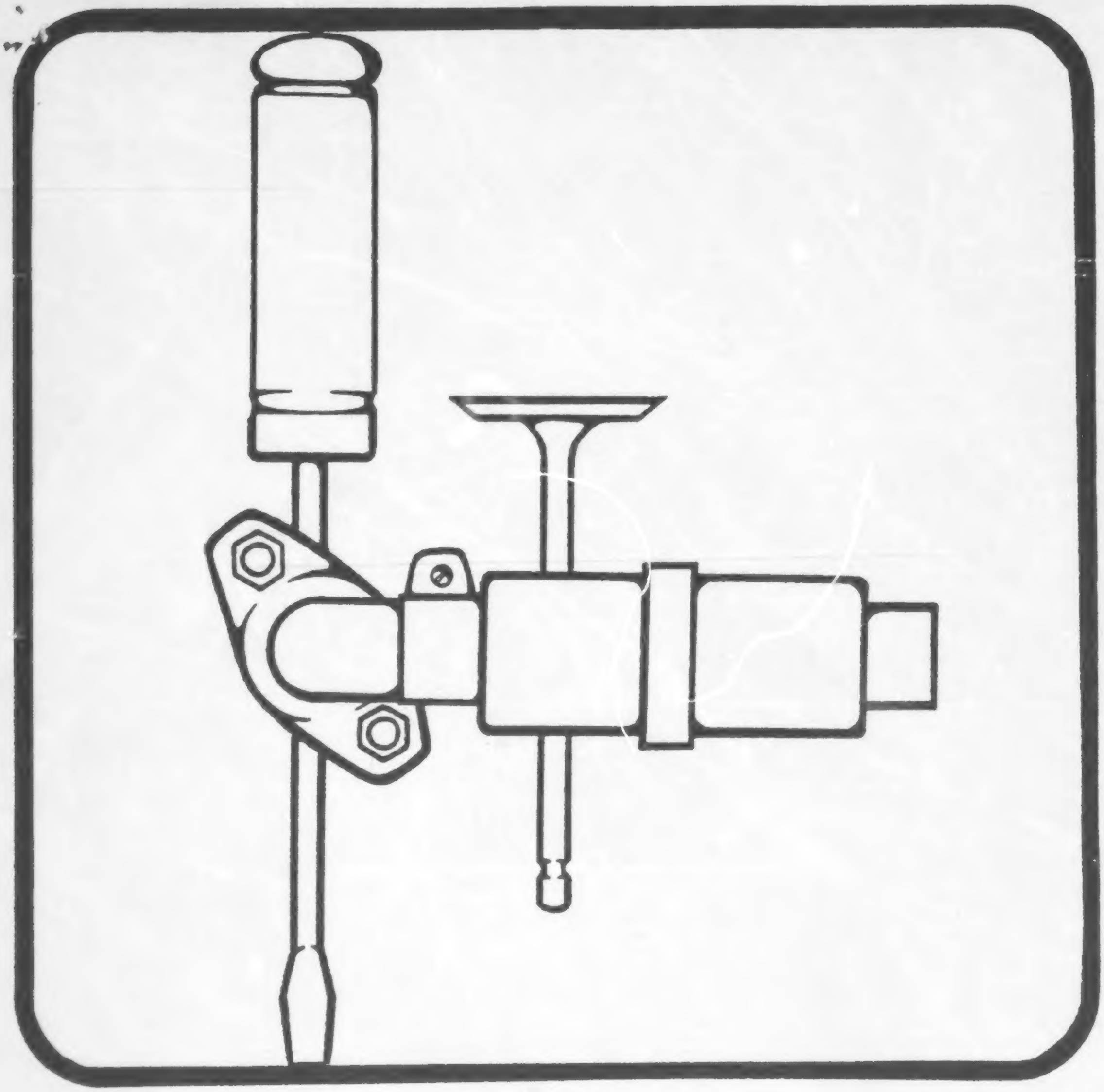
LOOK:

5. CHECK THE CLEARANCE ALL THE WAY AROUND THE PISTON FOR TIGHT SPOTS.



6. GET YOUR INSTRUCTOR AND TELL HIM WHAT THE RING LAND CLEARANCE IS.

7. WHEN YOU'RE FINISHED, PUT YOUR EQUIPMENT BACK IN THE RIGHT PLACE.



small engine repair

unit: RINGS & PISTON SERVICE

capital area career center

module: 7501 23 010 1
7501 23 010 3 date: MAY 1978 level: II

skill title: HOW TO SERVICE PISTONS AND RINGS

developed & written by: DON FOSTER & JACK HELDER

visuals by: DAVE WEHRWEIN

PERFORMANCE OBJECTIVE

YOU ARE GOING TO LEARN:

HOW TO SERVICE PISTONS & RINGS.

AND IN ORDER TO DO THIS YOU WILL NEED:

A 2- OR 4-CYCLE ENGINE

SOCKET SET

SCREWDRIVER SET

SEAL

GASKET SET

LUBRIPLATE

RUBBER MALLET

MICROMETER

RING GROOVE CLEANER

FEELER GAUGE

PISTON RING COMPRESSOR

"TURN THE PAGE"

WE WILL KNOW YOU CAN DO IT WHEN:

1. YOU HAVE DONE A COMPLETE RING JOB ON AN ENGINE.
2. YOU PUT TOGETHER THE ENGINE.
3. THE ENGINE WORKS WELL.

"TURN THE PAGE"

JOB STEPS

READ:	LOOK:
1. PUT ENGINE ON A WORK BENCH. BE SURE TO USE SAFETY GLASSES.	
2. TAKE OFF THE HEAD AND AIR HOUSING.	
3. DRAIN THE OIL FROM THE CRANKCASE.	

CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

1. TAKEN OFF HEAD AND AIR HOUSING
2. DRAINED THE OIL.
3. YOUR SAFETY GLASSES ON.

"TURN THE PAGE"

JOB STEPS

READ: LOOK:

4. TAKE OFF ENGINE SUMP.

5. TAKE OFF THE ROD BOLTS OR NUTS.

6. TAKE THE ROD AND PISTON OUT OF THE TOP OF THE CYLINDER.

    A. PUSH UP WITH ONE HAND AND PULL UP WITH THE OTHER.

    B. BE CAREFUL. DO NOT SCRATCH PISTON OR CYLINDER WALL.

CHECK: HAVE YOUR INSTRUCTOR CHECK THAT YOU HAVE REMOVED THE PISTON.

"TURN THE PAGE"

WORD GUIDE

SCORING - DEEP SCRATCHES

GALLING - LOOKS LIKE A RIP OR WELD MARK

JOB STEPS

READ: LOOK:

7. SERVICE THE RINGS AS YOU DID IN MODULE 7501 23 001 1
7501 23 001 3.

NOTE: BE SURE TO REMOVE RINGS TOWARD THE TOP OF THE PISTON.

DO NOT PUT RINGS IN YET.

CHECK: SHOW YOUR INSTRUCTOR THE RINGS YOU HAVE SERVICED.

8. CHECK THE CYLINDER FOR DAMAGE. LOOK FOR SCORING OR SCRATCHES.

NOTE: ON CHROME-PLATED CYLINDERS, CHECK FOR PEELING CHROME. ON ALUMINUM CYLINDERS, LOOK FOR GALLING.

9. CHECK PISTON SKIRT CLEARANCE. LOOK IN ENGINE MANUAL TO FIND RIGHT CLEARANCE.

"TURN THE PAGE"

JOB STEPS

READ: LOOK:

10. DEGLAZE THE CYLINDER. REFER
TO MOD 7501 23 003 1
7501 23 003 3.

CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

1. CHECKED CYLINDER WALLS.
2. DEGLAZED THE CYLINDER.

11. HOLD ONTO THE ROD END AND PUT PISTON INTO CYLINDER.

12. USING RIGHT THICKNESS OF FEELER GAUGE, CHECK CLEARANCE ON THE SIDE OF THE PISTON OPPOSITE THE WRIST PIN HOLES.

CHECK: TELL YOUR INSTRUCTOR THE AMOUNT OF CLEARANCE.

"TURN THE PAGE"

JOB STEPS

READ: LOOK:

13. IF PISTON MEETS CLEARANCE SPECS, PUT RINGS INTO THE CYLINDE

14. USING THE PISTON, PUSH RINGS DOWN TO BOTTOM OF RING TRAVEL. REMOVE PISTON.

15. CHECK RING END GAP. LOOK UP THE GAP NEEDED IN THE REPAIR MANUAL.

CHECK: TELL YOUR INSTRUCTOR IF THE RING END GAP IS RIGHT OR WRONG.

"TURN THE PAGE"

JOB STEPS

READ: LOOK:

16. PULL RINGS OUT OF PISTON IF THE RING GAP WAS RIGHT.

17. PUT RINGS ON THE PISTON, LIKE YOU DID IN MODULE 7501 23 001 1
7501 23 001 3.

18. USING A FEELER GAUGE, CHECK THE PISTON RING LAND CLEARANCE. CHECK REPAIR MANUAL OR YOUR INSTRUCTOR TO FIND OUT HOW MUCH CLEARANCE IS NEEDED.

CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

1. PUT RINGS ON PISTON.
2. CHECKED RING LAND CLEARANCE.

"TURN THE PAGE"

JOB STEPS

READ: LOOK:

19. PUT SMALL COAT OF OIL ON RINGS AND PISTON SKIRT.

20. CHECK TO SEE THAT RING GAPS ARE ON DIFFERENT SIDES OF THE PISTON.

CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

1. OILED RINGS AND PISTON SKIRT.
2. MADE SURE RING GAPS ARE ON DIFFERENT SIDES OF PISTON.

21. PUT PISTON RING COMPRESSOR ON THE PISTON. ROD MUST POINT DOWN.

"TURN THE PAGE"

JOB STEPS

READAD: LOOK:

22. PUT PISTON, ROD END FIRST, INTO THE CYLINDER.

23. GENTLY PUSH DOWN ON PISTON. DO NOT SCRATCH WALLS. PUSH DOWN UNTIL PISTON RING COMPRESSOR SLIDES OFF PISTON TOP.

CHECK: HAVE YOUR INSTRUCTOR CHECK THAT YOU HAVE PLACED THE PISTON & RINGS INTO THE CYLINDER.

24. GUIDE ROD ONTO THE CRANKSHAFT JOURNAL.

"TURN THE PAGE"

JOB STEPS

READ: LOOK:

25. MATCH UP THE ROD CAP WITH THE ROD END.

26. TIGHTEN ON BOLTS TO ROD CAP. BE SURE TO PUT ON OIL DIPPER OR SLINGER, IF NEEDED.

27. TORQUE BOLTS TO RIGHT AMOUNT. SEE THE MANUAL OR YOUR INSTRUCTOR.

CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

1. PUT ON ROD CAP.
2. TORQUED BOLTS.

"TURN THE PAGE"

JOB STEPS

READ: LOOK:

28. IF YOU TOOK OUT CAMSHAFT, REPLACE IT. BE SURE TO ALIGN TIMING MARKS, PUT ON LIFTERS, AND RETIME CAM TO CRANK.

CHECK: HAVE YOUR INSTRUCTOR CHECK YOUR WORK ON THE CAMSHAFT.

29. REMOVE CRANKSHAFT OIL SEAL FROM SUMP.

30. CLEAN THE SUMP.

"TURN THE PAGE"

JOB STEPS

READ: LOOK:

31. PUT NEW GASKET ON BLOCK.

32. LUBRIPLATE THE CAMSHAFT AND CRANKSHAFT BEARING SURFACES.

33. IF ENGINE HAS A SLINGER, BE SURE IT IS PUT ON.

CHECK: HAVE YOUR INSTRUCTOR CHECK YOUR WORK ON THE SUMP.

"TURN THE PAGE"

JOB STEPS

READ: LOOK:

34. PUT SUMP ON CRANKSHAFT. ALIGN CAMSHAFT WITH BEARING HOLE. DO NOT FORCE SUMP DOWN.

35. PUT IN SUMP BOLTS. TORQUE THEM TO RIGHT AMOUNT (MOST OFTEN, IT IS 65 INCH POUNDS).

CHECK: HAVE YOUR INSTRUCTOR CHECK THAT YOU HAVE:

1. PUT SUMP ON CRANKSHAFT.
2. TORQUED SUMP BOLTS.

36. PUT NEW OIL SEAL ON SUMP.

"TURN THE PAGE"

JOB STEPS

READ: LOOK:

37. PUT NEW HEAD GASKET ON ENGINE.

38. PUT ON THE HEAD. TORQUE THE BOLTS TO THE RIGHT AMOUNT. SEE MANUAL OR YOUR INSTRUCTOR FOR RIGHT AMOUNT OF TORQUE.

CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

1. PUT ON NEW OIL SEAL.
2. PUT ON NEW HEAD GASKET.
3. TORQUED HEAD BOLTS.

39. PUT ON AIR HOUSING.

"TURN THE PAGE"

JOB STEPS

READ: LOOK:

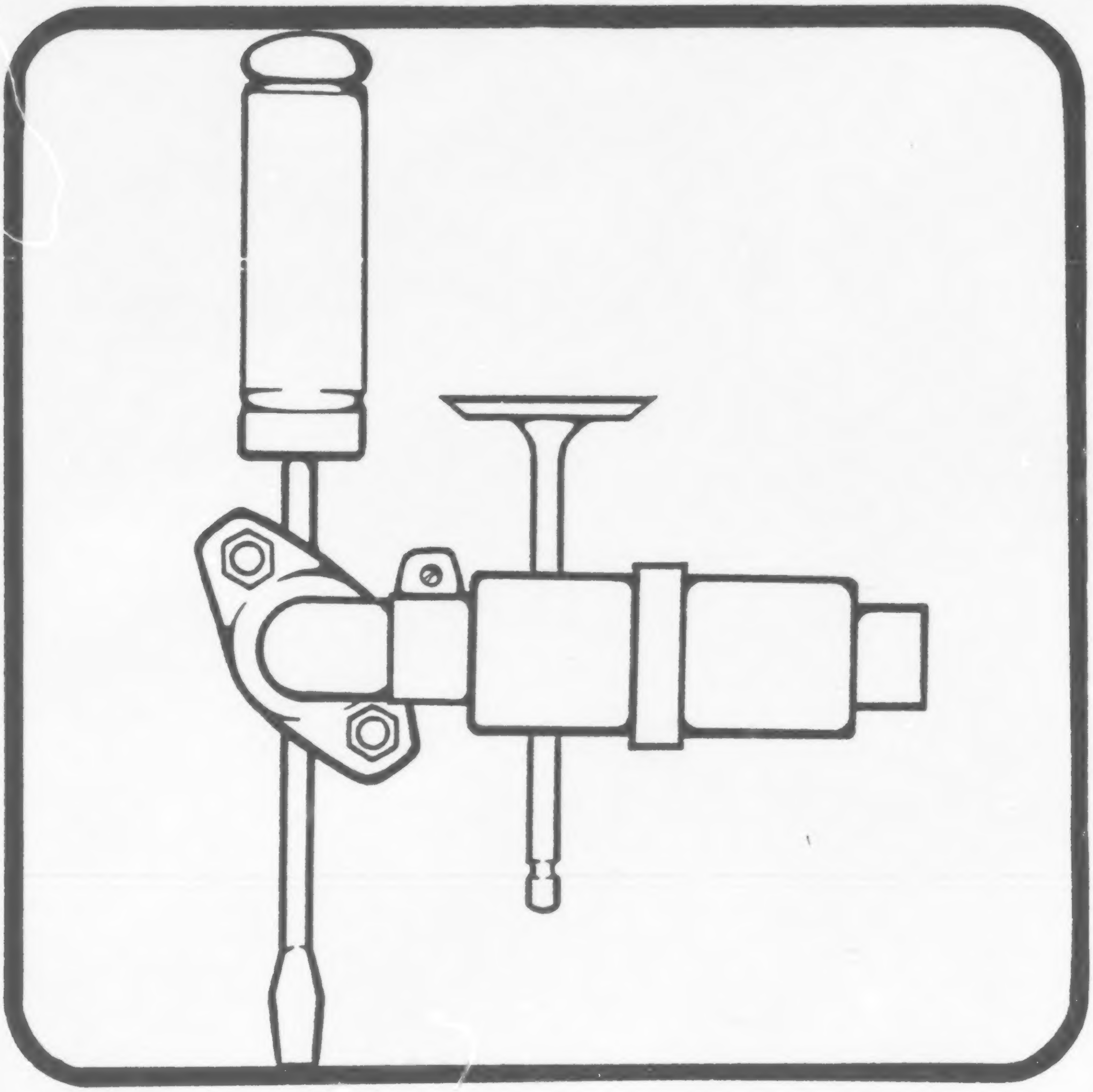
40. FILL ENGINE WITH OIL. ALSO PUT GAS IN TANK.

41. START ENGINE AND ADJUST IT.

42. TORQUE CYLINDER HEAD AGAIN.

43. CLEAN UP ENGINE.

CHECK: WOW! YOU'VE DONE A LOT OF WORK. NOW HAVE YOUR INSTRUCTOR CHECK YOUR WORK.



small engine repair

unit: VALVES

capital area career center

module: 7501 24 001 1
7501 24 001 3 date: MAY 1978 level: I

skill title: REMOVE AND REPLACE VALVE CHAMBER BREATHER OR COVER

developed & written by: JACK HELDER

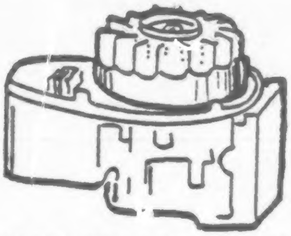
visuals by: DAVE WEHRWEIN

PERFORMANCE OBJECTIVE

YOU ARE GOING TO LEARN:

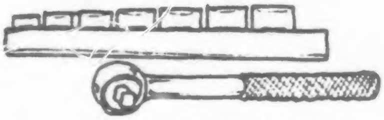
HOW TO REMOVE AND REPLACE THE VALVE CHAMBER BREATHER OR COVER.

AND IN ORDER TO DO THIS YOU WILL NEED:



A CUT-AWAY BRIGGS & STRATTON ENGINE

TORQUE WRENCH



SOCKET SET

SAFETY GLASSES

WE WILL KNOW YOU CAN DO IT WHEN:

1. YOU HAVE GATHERED THE RIGHT EQUIPMENT.
2. YOU HAVE TAKEN OFF AND PUT BACK ON A VALVE CHAMBER BREATHER OR COVER SO THAT:
   A) THE SMALL HOLES ARE IN THE RIGHT PLACE.
   B) THE BOLTS ARE TORQUED THE RIGHT AMOUNT.

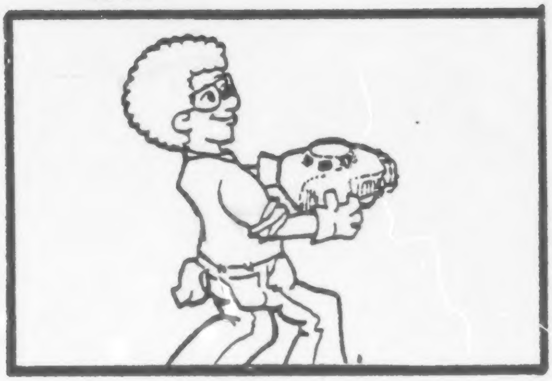
"TURN THE PAGE"

JOB STEPS

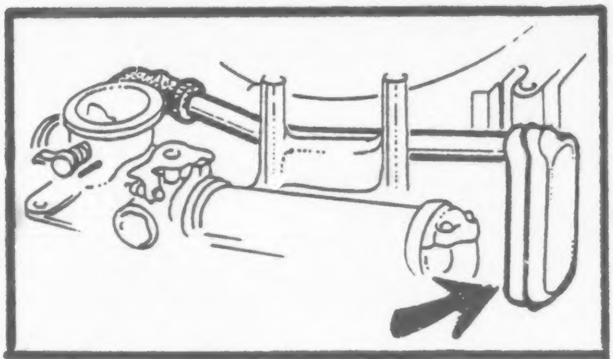
READ:

LOOK:

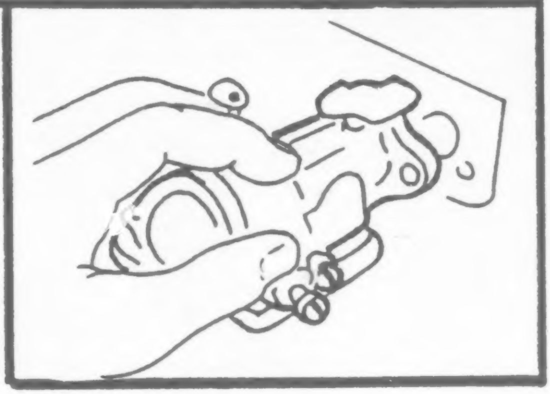
1. TAKE YOUR EQUIPMENT TO THE WORK AREA. →



2. FIND THE VALVE BREATHER ON THE CUT-AWAY ENGINE.
    - A. MOST BREATHERS ARE UNDER THE CARBURETOR OR MANIFOLD.
    - B. ON SOME BRIGGS & STRATTON ENGINES THE BREATHER IS ON THE SIDE OPPOSITE THE CARBURETOR. →



3. IF THE CARBURETOR IS IN THE WAY, TAKE IT OFF. →



CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

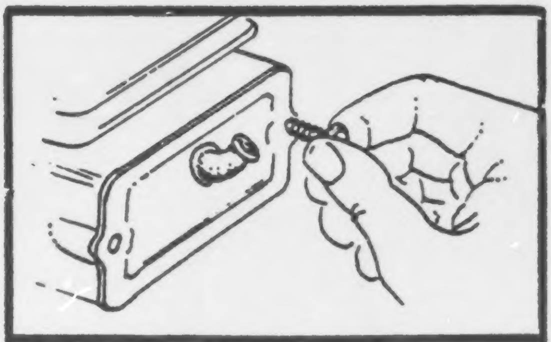
1. FOUND THE VALVE BREATHER ON THE ENGINE YOU ARE WORKING ON.
2. TAKEN OFF THE CARBURETOR, IF NEEDED.

JOB STEPS

READ:

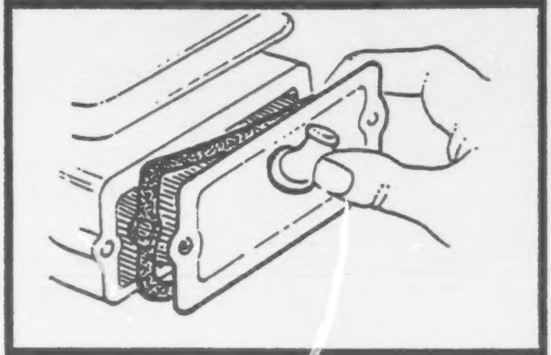
LOOK:

4. TAKE OUT THE BOLTS WHICH HOLD ON THE VALVE BREATHER. →

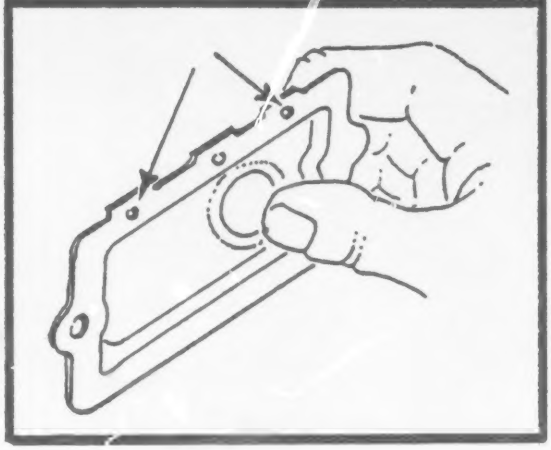


5. TAKE OFF THE VALVE BREATHER. →

NOTE: WATCH THE WAY IT COMES OFF. YOU MUST PUT IT BACK ON IN THE SAME WAY OR THE ENGINE WILL BURN OIL OR LEAK OIL.



6. CHECK THE VALVE BREATHER FOR SMALL HOLES. THESE HOLES ALLOW THE OIL TO DRAIN INTO THE CRANKCASE. THE HOLES SHOULD FACE IN WHEN YOU PUT THE COVER BACK ON. →



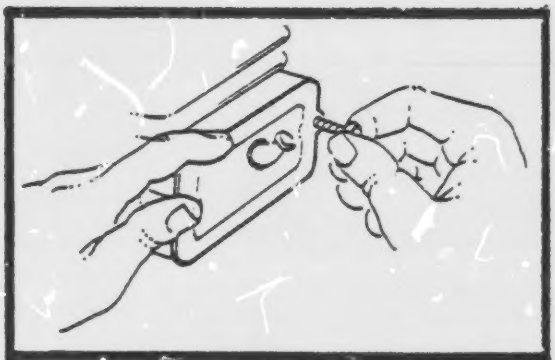
CHECK: SHOW THE SMALL HOLES TO YOUR INSTRUCTOR.

"TURN THE PAGE"

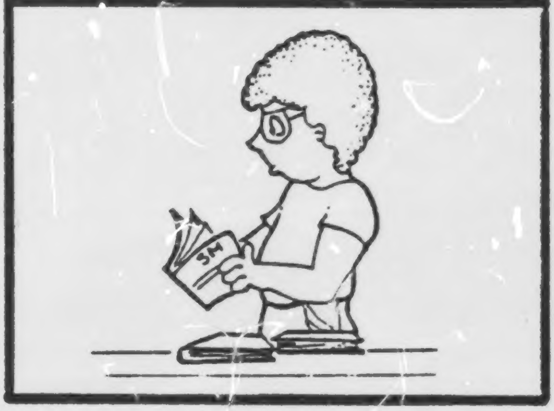
JOB STEPS

READ: LOOK:

7. PUT THE BREATHER BACK ON THE ENGINE. BE SURE TO PUT IT ON THE RIGHT WAY (WITH THE HOLES IN). →



8. TORQUE THE BOLTS TO THE RIGHT AMOUNT. CHECK THE BRIGGS AND STRATTON MANUAL, OR YOUR INSTRUCTOR, FOR THE TORQUE SPECIFICATIONS. →

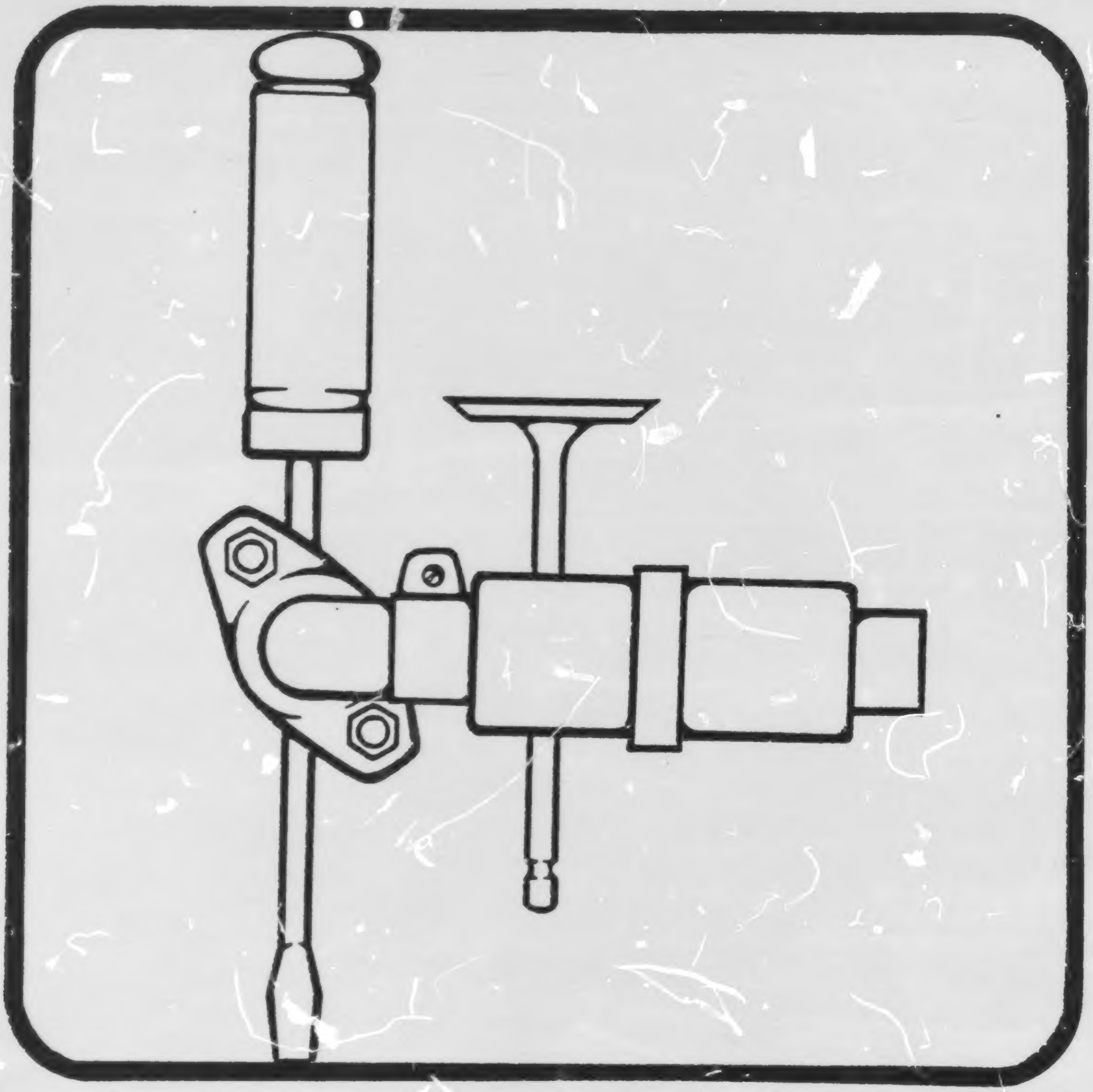


CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

1. PUT THE BREATHER ON THE RIGHT WAY.
2. TORQUED THE BOLTS THE RIGHT AMOUNT.

9. PUT AWAY YOUR TOOLS AND CLEAN UP THE WORK AREA.

CHECK: ASK YOUR INSTRUCTOR TO CHECK YOUR WORK AREA.



small engine repair

unit: VALVES

capital area career center

module: 7501 24 002 1
7501 24 002 3 date: DECEMBER 1977 level: I

skill title: REMOVE AND REPLACE VALVE SPRING

developed & written by: JACK-HELDER

visuals by: DAVE WEHRWEIN

WORD GUIDE

REMOVE - TAKE OFF OR TAKE OUT

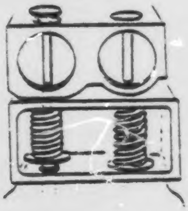
REPLACE - CHANGE OR PUT BACK

PERFORMANCE OBJECTIVE

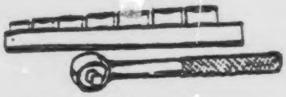
YOU ARE GOING TO LEARN:

HOW TO REMOVE VALVE SPRINGS IN THE BRIGGS AND STRATTON ENGINE.

AND IN ORDER TO DO THIS YOU WILL NEED:

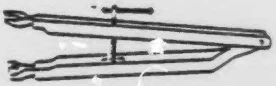


A DISPLAY NUMBER II
OR AN ENGINE WITH VALVES
IN IT

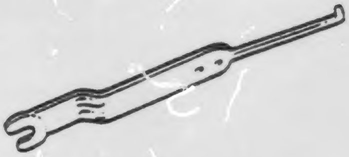


SOCKET WRENCH SET

SAFETY GLASSES



VALVE SPRING COMPRESSOR



A VALVE TOOL

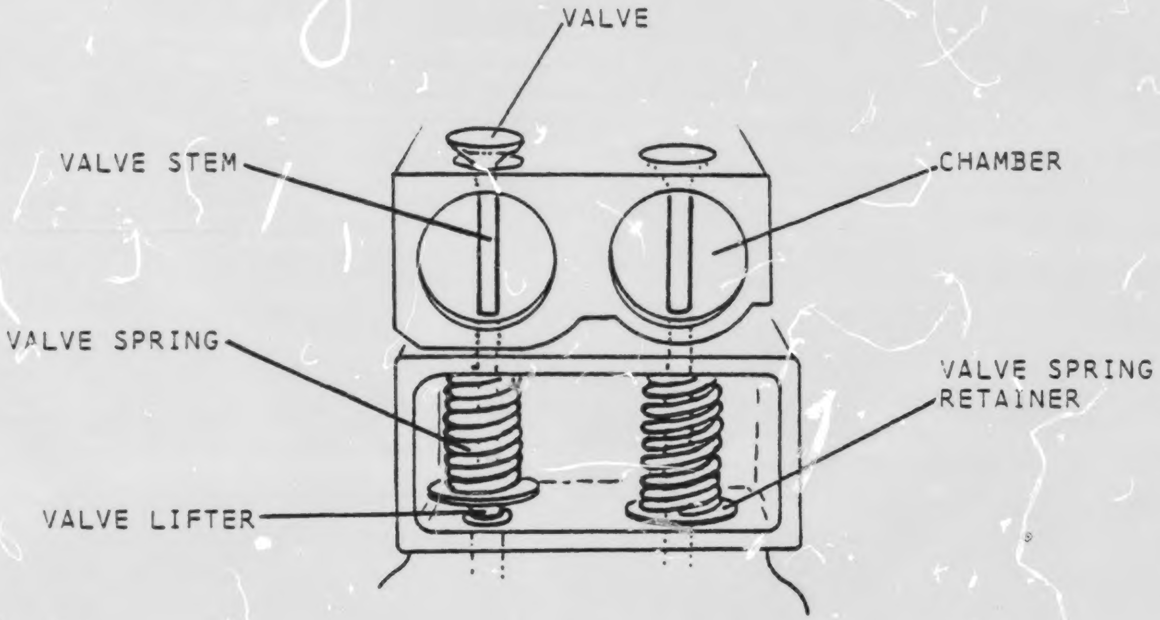
WE WILL KNOW YOU CAN DO IT WHEN:

1. YOU HAVE ALL YOUR EQUIPMENT.
2. YOU HAVE REMOVED AND REPLACED THE VALVE SPRINGS IN THEIR RIGHT PLACES.

"TURN THE PAGE"

INFORMATION

SHOWN BELOW IS A PICTURE OF A VALVE CHAMBER ASSEMBLY. IT SHOWS ALL THE PARTS. BEFORE YOU BEGIN THE JOB STEPS, STUDY THE PICTURE AND MAKE SURE YOU KNOW WHERE TO FIND ALL THE PARTS.


VALVE
VALVE STEM
CHAMBER
VALVE SPRING
VALVE SPRING RETAINER
VALVE LIFTER

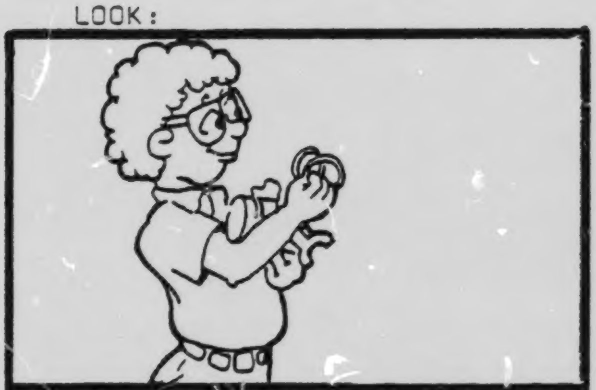
THEN FOLLOW THE JOB STEPS TO REMOVE AND REPLACE VALVES AND THEIR SPRINGS.

JOB STEPS

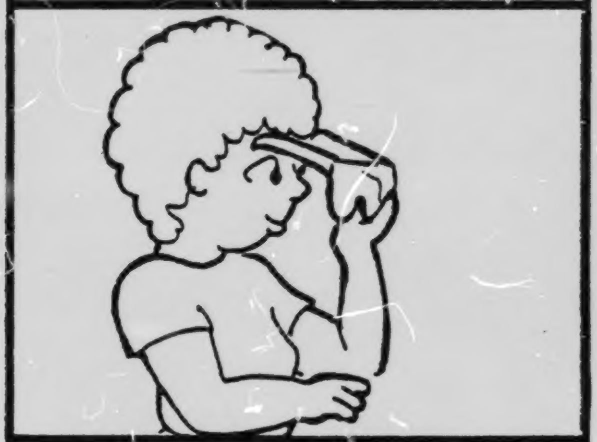
READ:

LOOK:

1. GET ALL YOUR EQUIPMENT AND TAKE IT TO YOUR WORK AREA.

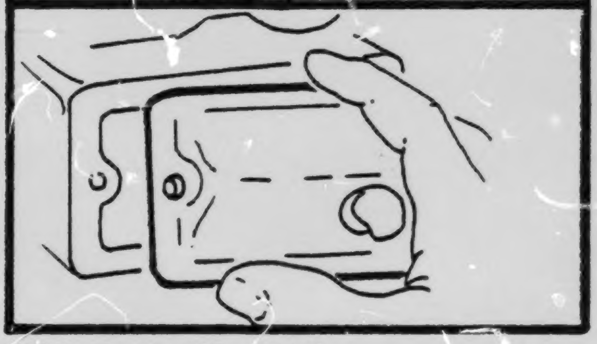


2. PUT ON YOUR SAFETY GLASSES.



3. WITH YOUR SOCKET WRENCH SET, TAKE OFF THE VALVE CHAMBER BREATHER ASSEMBLY FROM THE ENGINE.

NOTE: YOU LEARNED HOW TO DO THIS WITH MOD 7501 24 001



CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

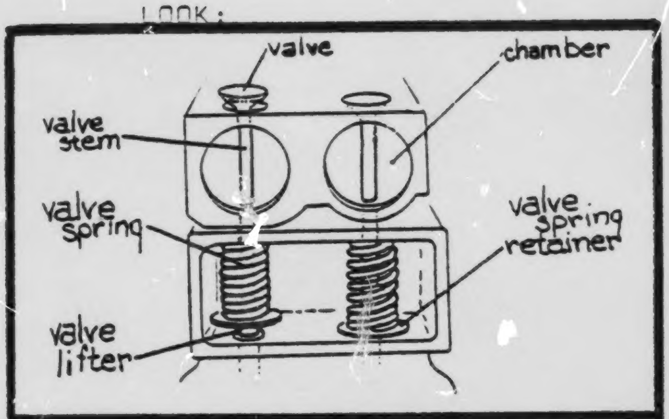
1. ALL YOUR EQUIPMENT.
2. PUT ON YOUR SAFETY GLASSES.
3. REMOVED THE VALVE CHAMBER BREATHER ASSEMBLY.

"TURN THE PAGE"

JOB STEPS

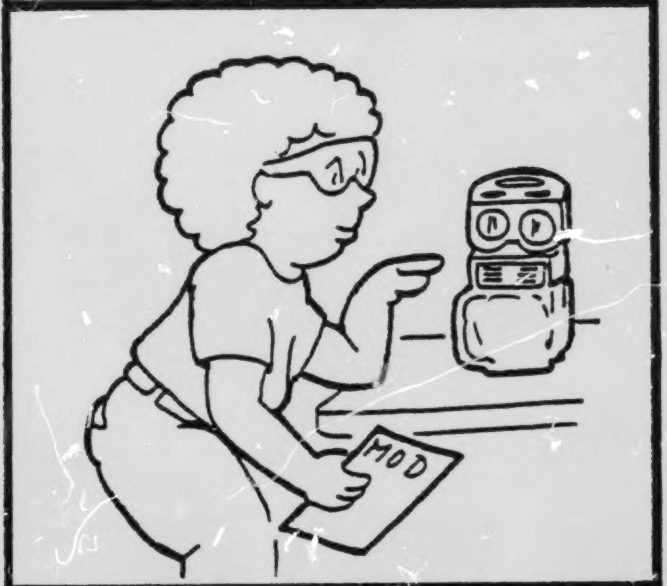
READ: LOOK:

4. STUDY THE PICTURE IN THIS MOD OF THE VALVE BREATHER ASSEMBLY. →

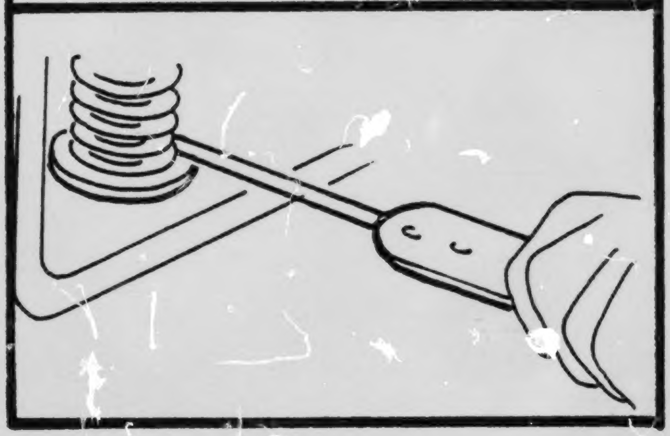

valve
chamber
valve stem
valve spring
valve spring retainer
valve lifter

5. STUDY THE REAL VALVE CHAMBER BREATHER ASSEMBLY. MAKE SURE ALL THE PARTS IN THE PICTURE ARE THE SAME AS IN THE REAL PART. →

6. FIND THE VALVE SPRING RETAINER. →



7. USING THE POINTED END OF THE VALVE TOOL, FIND THE GROOVE IN THE RETAINER. →

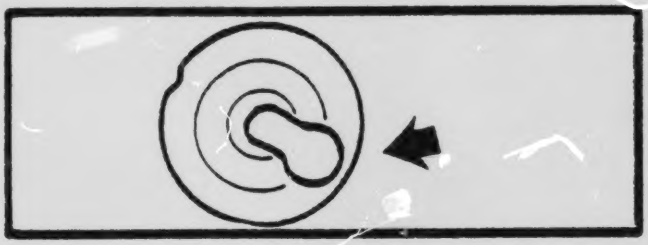


"TURN THE PAGE"

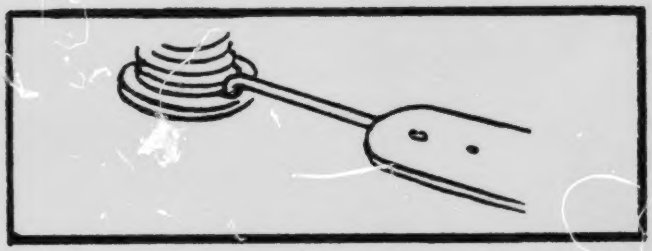
JOB STEPS

READ: LOOK:

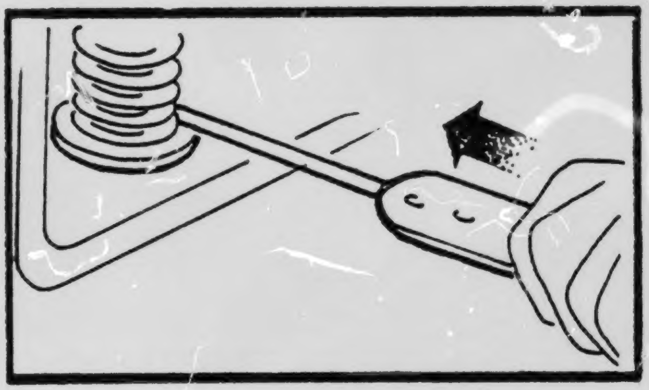
8. NOW FIND THE LARGE HOLE ON THE OTHER SIDE OF THE GROOVE. →



9. USING YOUR VALVE TOOL, PUT THE POINTED END IN THE LARGE HOLE OF THE RETAINER. →



10. MOVE THE LARGE HOLE TO THE INSIDE OF THE CHAMBER BY PUSHING IT WITH THE TOOL. →



NOTE: IF THERE IS NO GROOVE, FEEL WITH THE POINTED END OF THE TOOL UNTIL YOU KNOW WHERE THE HOLE IS. THEN MOVE IT TO THE INSIDE OF THE CHAMBER.

CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

1. STUDIED AND COMPARED THE PICTURE AND THE REAL VALVE BREATHER ASSEMBLY.
2. FOUND THE GROOVE.
3. FOUND THE LARGE HOLE ON THE OTHER SIDE OF THE GROOVE.
4. MOVED THE LARGE HOLE INTO THE INSIDE OF THE CHAMBER.

"TURN THE PAGE"

WORD GUIDE

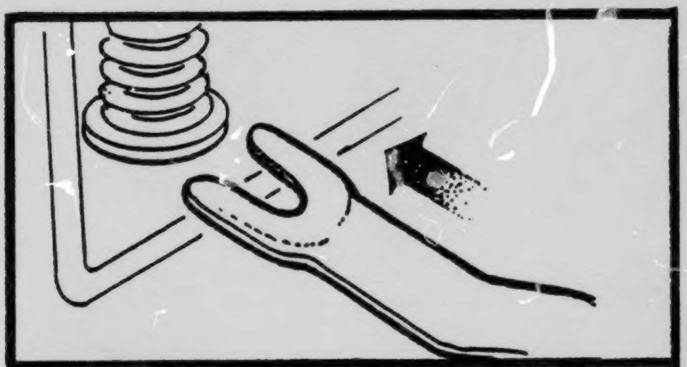
RELEASE - LET GO OF

JOB STEPS

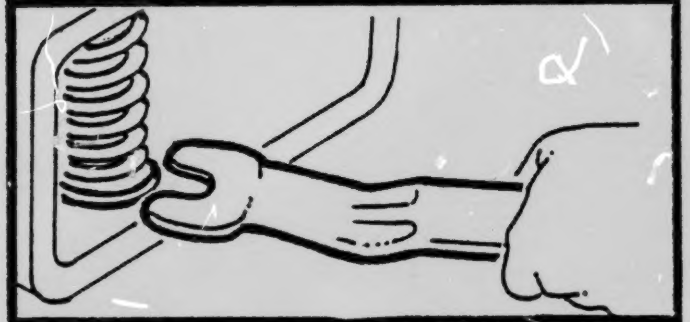
READ:

LOOK:

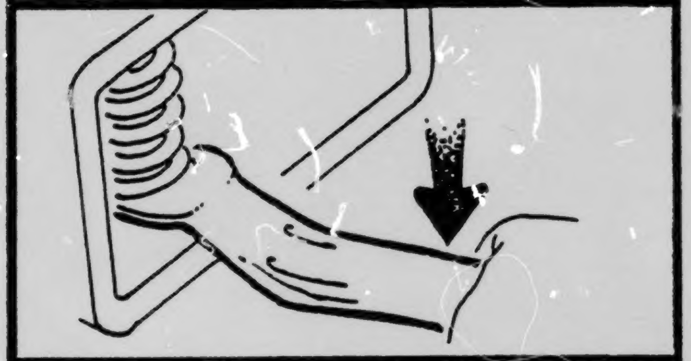
11. USING YOUR VALVE TOOL, PUT THE GROOVE IN OVER THE VALVE STEM.



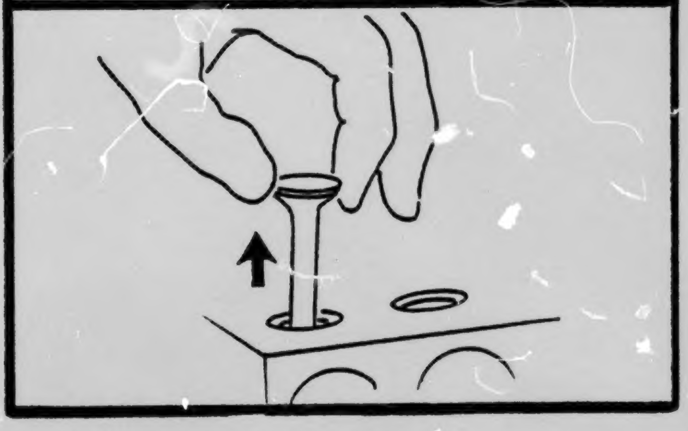
12. SLIDE THE TOOL INTO THE VALVE CHAMBER BETWEEN THE RETAINER AND THE BOTTOM -- OR LIFTER SIDE -- OF THE CHAMBER.



13. FIT THE TOOL OVER THE RETAINER AND PRESS THE TOOL DOWN. THIS WILL FORCE UP THE VALVE SPRING AND RETAINER TO RELEASE THE VALVE STEM FROM THE RETAINER.



14. USING CARE, REMOVE THE VALVE WITH YOUR HAND.

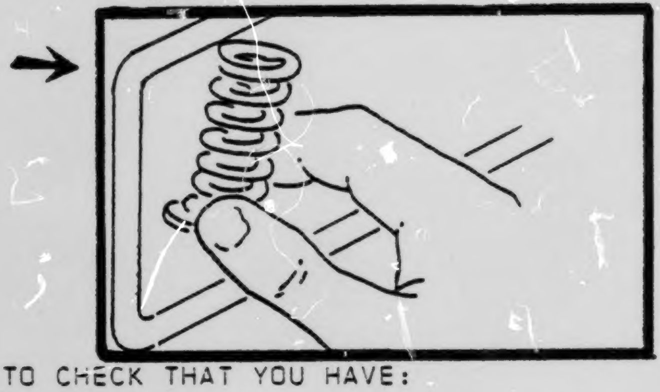


"TURN THE PAGE"

JOB STEPS

READD: LOOK:

15. THEN, GENTLY SLIDE OUT THE RETAINER AND THE SPRING.

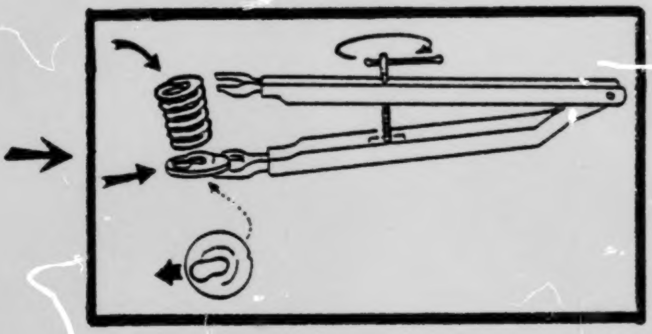


CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

1. REMOVED THE VALVE.
2. REMOVED THE RETAINER.
3. REMOVED THE SPRING.

NOTE: BE CAREFUL TO KEEP TRACK OF THE SPRINGS SO YOU DON'T MIX THEM UP WHEN PUTTING THEM BACK IN.

16. WHEN YOU ARE READY TO RETURN THE VALVE, VALVE SPRING AND RETAINER TO THE ENGINE, PUT THE VALVE SPRING AND RETAINER INTO A VALVE SPRING COMPRESSOR.



NOTE: THE RETAINER HOLE MUST BE TOWARD THE INSIDE OF THE VALVE CHAMBER, SO BE SURE TO PUT THE COMPRESSOR ON THE RIGHT WAY.

CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

1. KEPT THE VALVE, VALVE SPRING AND RETAINER IN THE RIGHT ORDER.
2. PUT THE VALVE SPRING AND RETAINER IN THE VALVE SPRING COMPRESSOR THE RIGHT WAY.

"TURN THE PAGE"

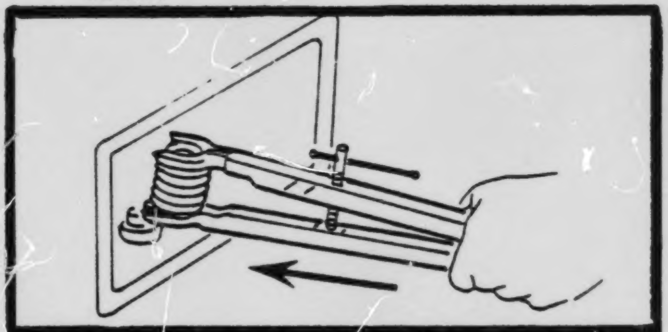
JOB STEPS

READ:

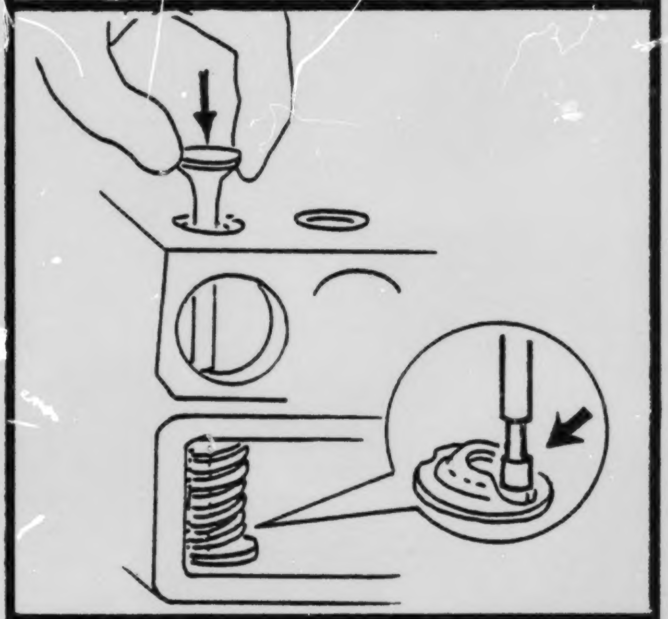
LOOK:

17. PUT THE RETAINER AND SPRING OVER THE LIFTER AND INTO THE CHAMBER.

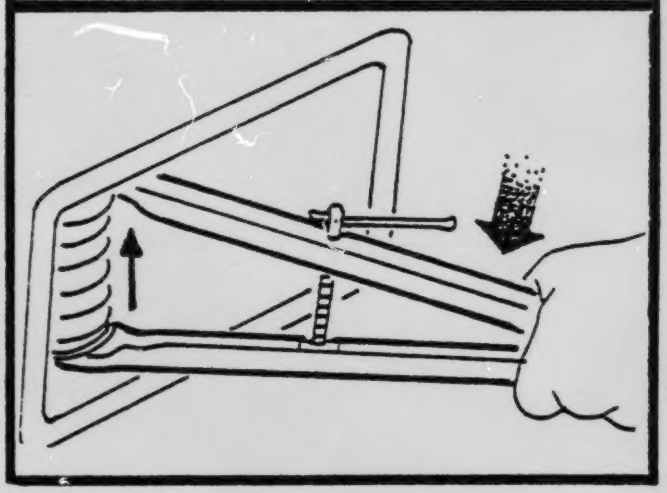
NOTE: NOW YOU'RE READY TO RELEASE THE TIGHTNESS (TENSION) ON THE COMPRESSOR



18. PUT THE VALVE BACK INTO THE VALVE CHAMBER AND PUSH IT THROUGH THE RETAINER HOLE.



19. PUSH DOWN ON THE COMPRESSOR, FORCING UP THE SPRING AND RETAINER UNTIL THE VALVE STEM FITS INTO THE CENTER OF THE RETAINER.

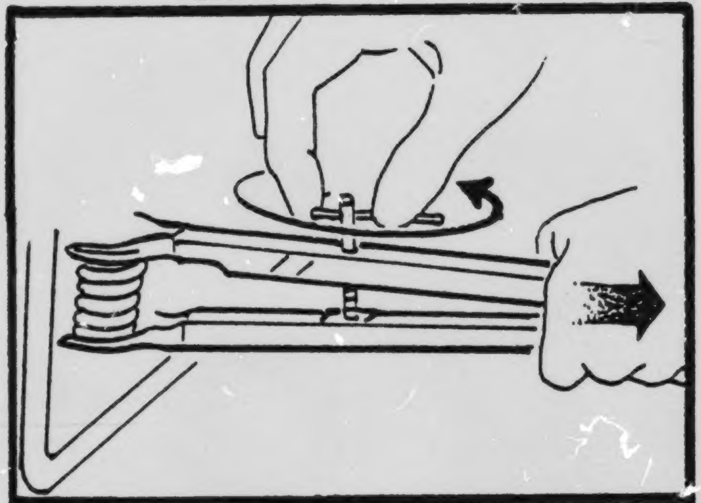


"TURN THE PAGE"

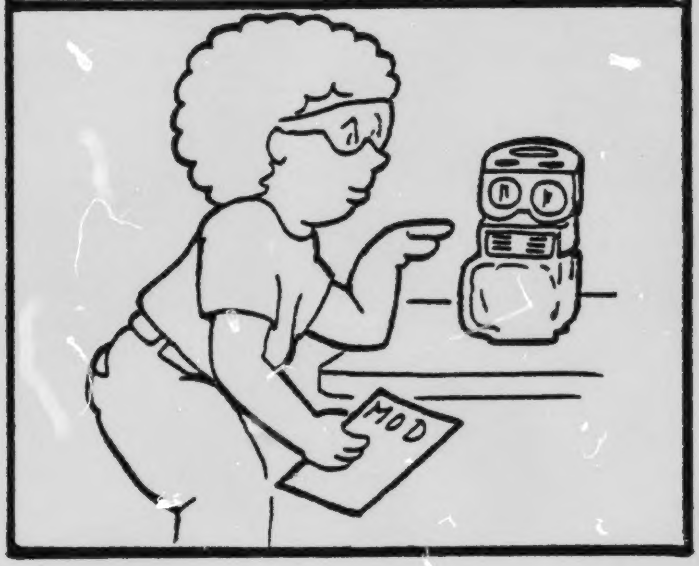
JOB STEPS

READ: LOOK:

20. RELEASE THE TENSION (OR TIGHTNESS) ON THE COMPRESSOR AND TAKE IT OUT OF THE CHAMBER. →



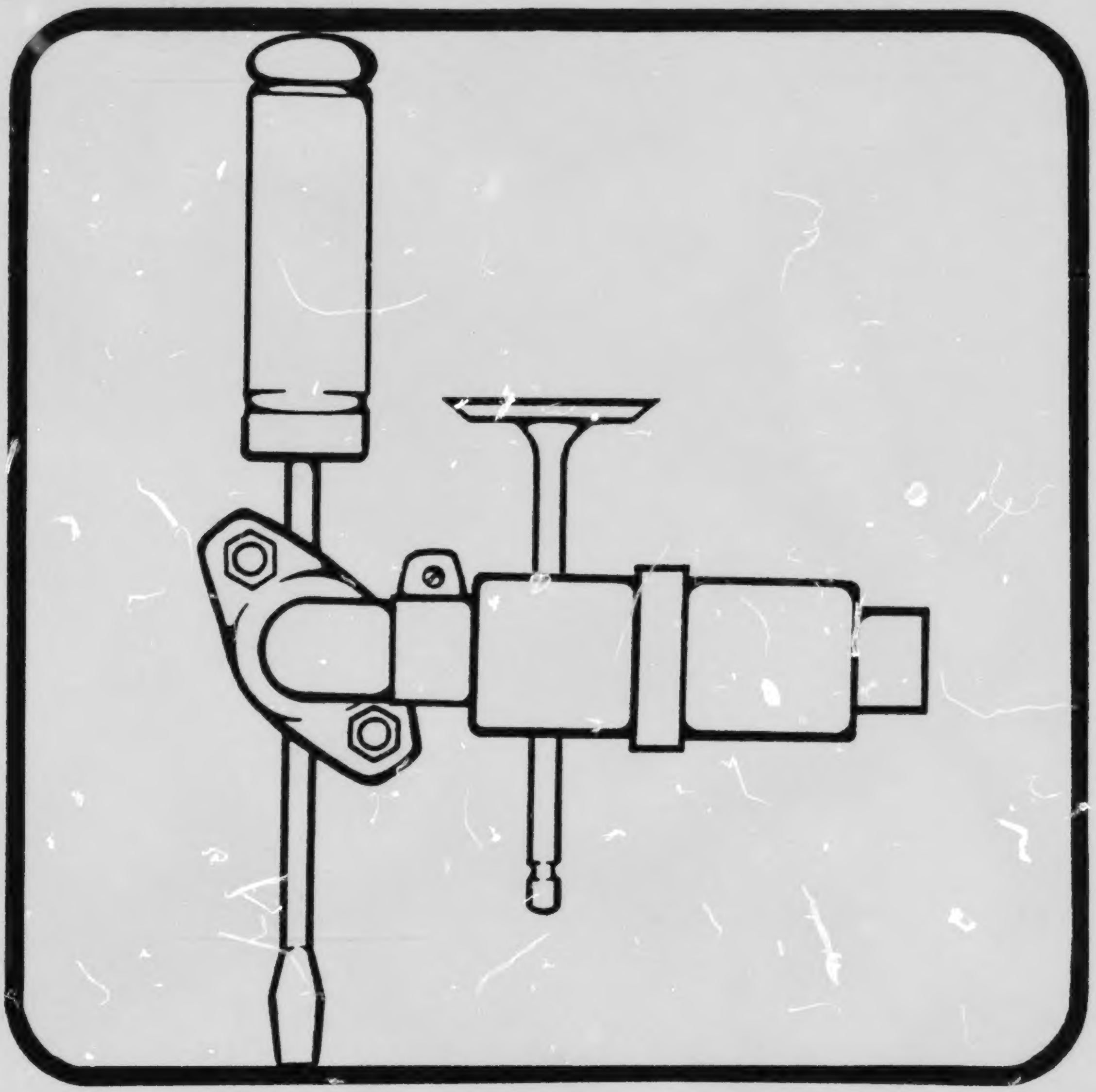
21. CHECK TO SEE THAT THE VALVE IS BACK IN THE CENTER HOLE OF THE RETAINER AND THAT THE VALVE SPRING IS STRAIGHT. →



CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

1. PUT THE RETAINER AND SPRING INTO THE CHAMBER.
2. PUT THE VALVE BACK INTO THE CHAMBER.
3. FIT THE VALVE STEM INTO THE CENTER OF THE RETAINER.
4. RELEASED TENSION ON THE COMPRESSOR AND TAKEN IT OUT OF THE CHAMBER.
5. CHECKED THAT THE VALVE SPRING IS STRAIGHT.

NOTE: ASK YOUR INSTRUCTOR IF IT IS OK TO PRACTICE DOING THIS SOME MORE. IF IT IS, DO THE SAME THING AGAIN ON THE OTHER VALVES.



small engine repair

unit: VALVES

capital area career center

module: 7501 24 003 1
7501 24 003 3 date: MAY 1978 level: II

skill title: VALVE PARTS IDENTIFICATION AND CHECK VALVE MARGINS

developed & written by: JACK HELDER

visuals by: DAVE WEHRWEIN

WORD GUIDE

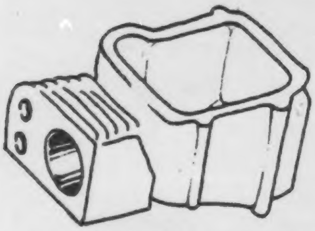
IDENTIFY - TO KNOW WHEN YOU SEE

PERFORMANCE OBJECTIVE

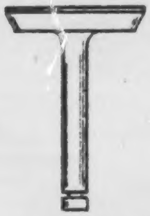
YOU ARE GOING TO LEARN:

HOW TO IDENTIFY VALVE PARTS AND CHECK VALVE MARGIN

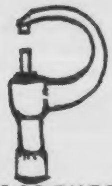
AND IN ORDER TO DO THIS YOU WILL NEED:



A CUT-AWAY ENGINE



MANY VALVES



MICROMETER

WE WILL KNOW YOU CAN DO IT WHEN:

1. YOU CAN GATHER ALL YOUR EQUIPMENT.
2. YOU CAN TELL YOUR INSTRUCTOR ALL THE PARTS OF A VALVE.
3. YOU TELL THE MARGIN OF ALL VALVES, USING THE MICROMETER.

"TURN THE PAGE"

JOB STEPS

READ: LOOK:

1. LOOK AT THE SAMPLE VALVES. PUT THE LARGE ONES INTO ONE PILE AND THE SMALL ONES INTO ANOTHER PILE.

A. LARGER VALVES ARE INTAKE VALVES. THEY MAY BE MARKED WITH AN "I" OR "IN".

B. SMALLER VALVES ARE EXHAUST VALVES. THEY MAY BE MARKED WITH AN "X" OR "EX".

CHECK: SHOW YOUR INSTRUCTOR:

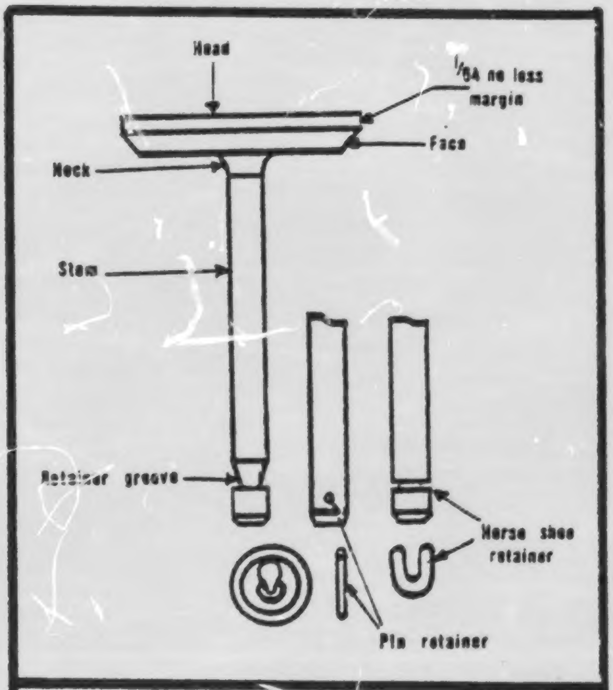
1. THE INTAKE VALVES
2. THE EXHAUST VALVES.

"TURN THE PAGE"

JOB STEPS

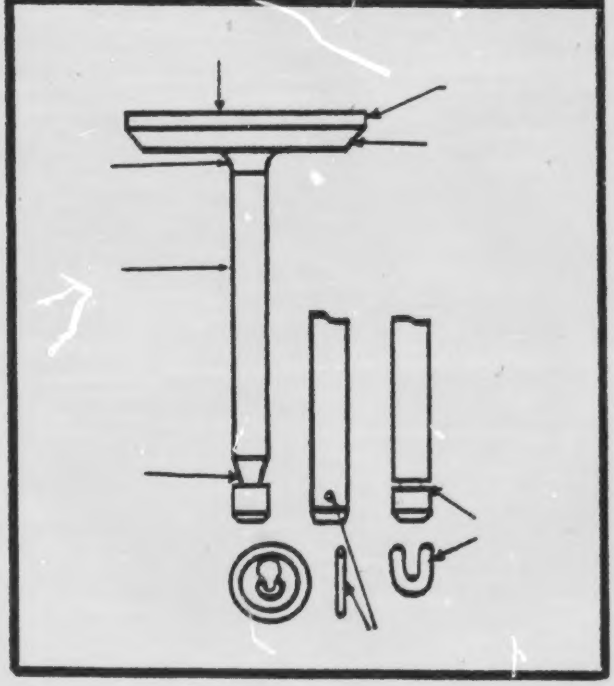
READ: LOOK:

2. STUDY THE PARTS OF A VALVE IN THIS DRAWING. ➔


Head
1/64 no less margin
Face
Neck
Stem
Retainer groove
Horse shoe retainer
Pin retainer

NOTE: STUDY JOB STEP 2 DRAWING UNTIL YOU KNOW ALL THE PARTS.

3. NOW TELL YOUR INSTRUCTOR ALL THE PARTS OF A VALVE IN THIS DRAWING: ➔



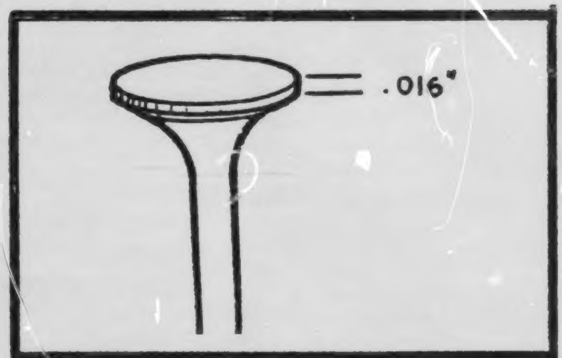
"TURN THE PAGE"

JOB STEPS

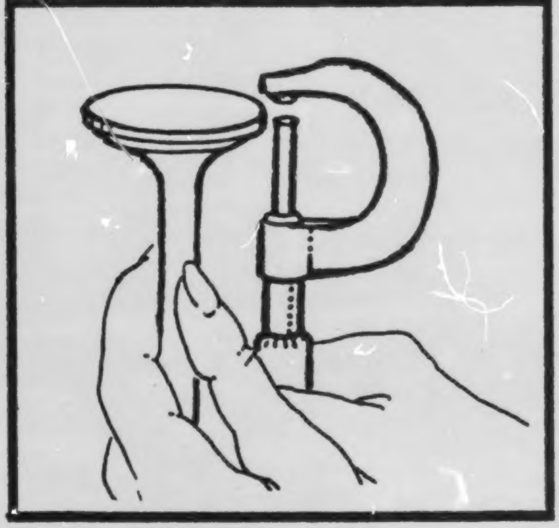
READ: LOOK:

4. LOOK AT THE MARGIN IN THIS VALVE. IT IS .016".

NOTE: VALVE MARGIN CAN BE NO LARGER THAN .016. IF IT IS, THE VALVE IS NOT GOOD.



5. TO CHECK VALVE MARGIN:
   A. SET YOUR MICROMETER AT .016.
   B. TRY TO PUT THE VALVE MARGIN INTO THE MICROMETER.
   C. IF MARGIN FIT IN, VALVE IS NOT GOOD.



6. CHECK THE MARGIN ON ALL THE VALVES. PUT THE GOOD ONES IN ONE PILE, PUT THE BAD ONES IN ANOTHER PILE.

CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

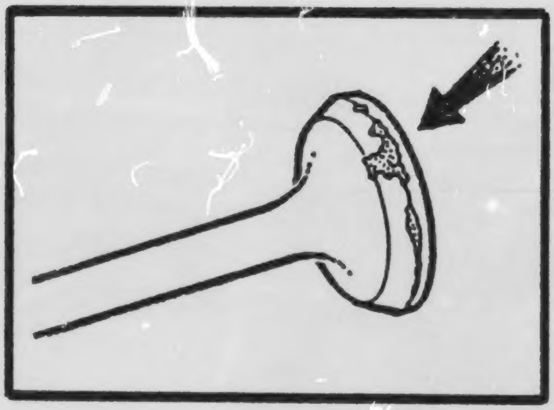
1. LEARNED HOW TO CHECK VALVE MARGIN.
2. CHECKED ALL THE VALVES.

"TURN THE PAGE"

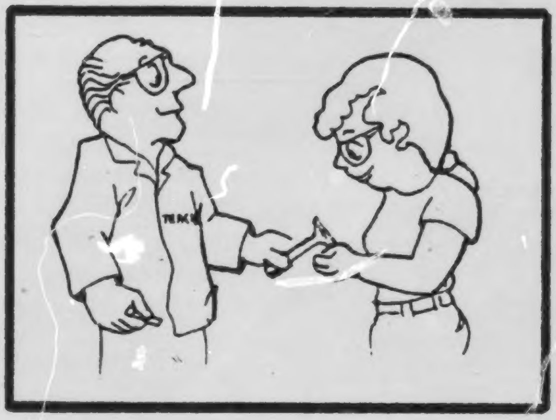
JOB STEPS

READ: LOOK:

7. FIND A GOOD VALVE WITH A BURNED FACE. SHOW THE VALVE TO YOUR INSTRUCTOR.



8. HAVE YOUR INSTRUCTOR SHOW YOU HOW TO GRIND THE BURNED PART. YOU MUST NOT MAKE THE MARGIN TOO LARGE.



9. NOW FIND ONE MORE GOOD VALVE WITH A BURNED FACE.

10. GRIND THE VALVE FACE TO TAKE OFF THE BURN.

CAUTION: DO NOT GRIND THE VALVE TOO MUCH BECAUSE THE MARGIN WILL BECOME TOO LARGE.

CHECK: SHOW THE VALVE TO YOUR INSTRUCTOR.

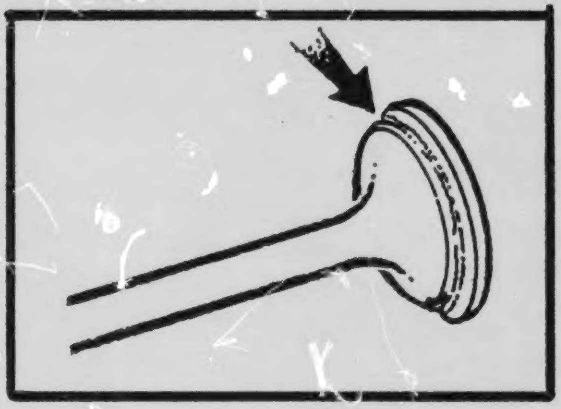
"TURN THE PAGE"

JOB STEPS

FREAD:

11. NOW FIND A GOOD VALVE THAT HAS POUNDING WEAR ON THE FACE.

LOOK:

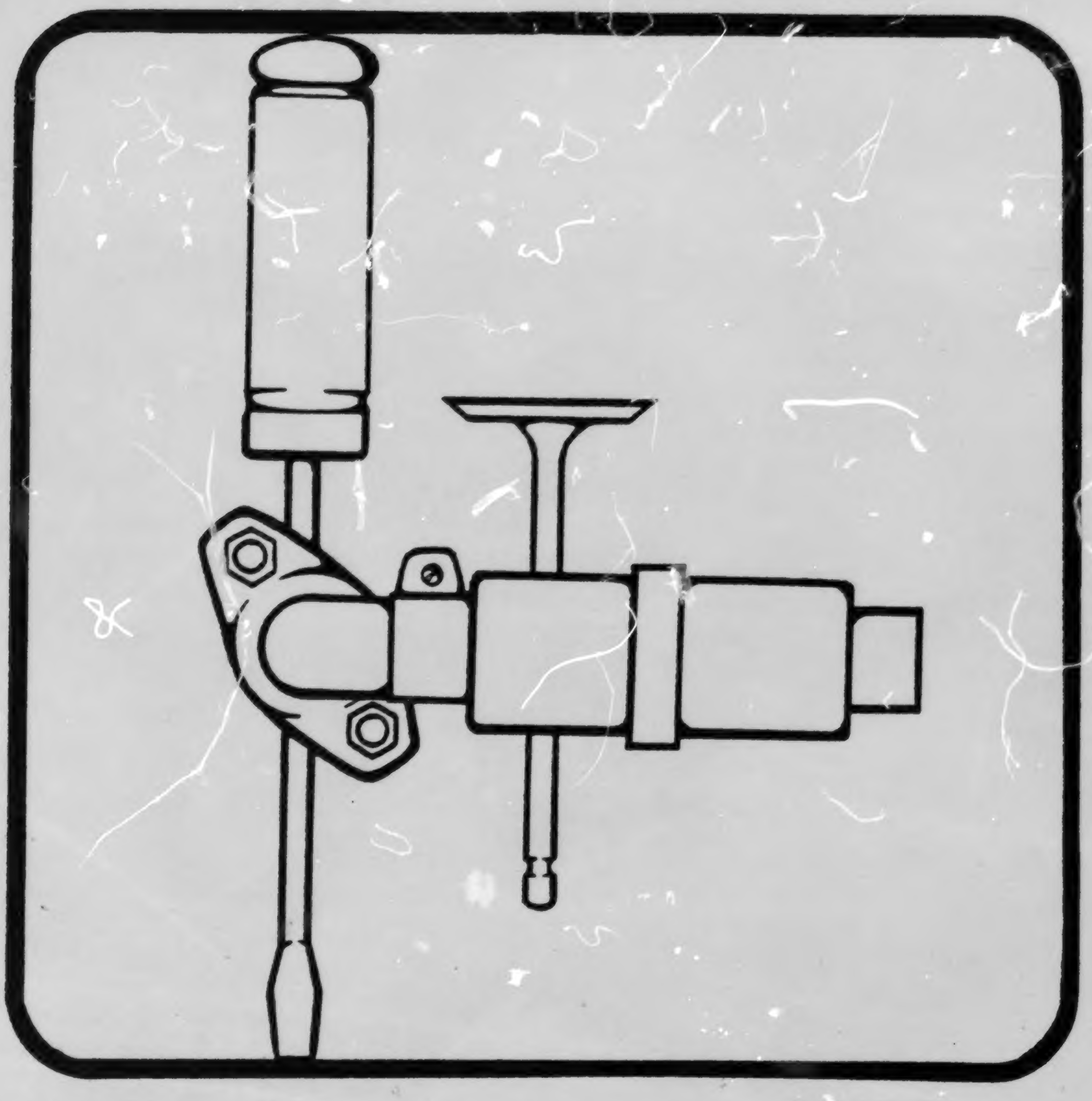


12. GRIND THE VALVE FACE UNTIL THE POUNDING WEAR (GROOVE) IS REMOVED. BE SURE VALVE MARGIN IS NOT TOO LARGE.

CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

1. GROUND OFF THE POUNDING WEAR, OR GROOVE.
2. MADE SURE THE VALVE MARGIN IS NO LARGER THAN .016" AFTER GRINDING.

13. NOW TELL YOUR INSTRUCTOR ALL THE PARTS OF A VALVE.



small engine repair

unit:

capital area career center

module: 7501 24 004 1
7501 24 004 3 date: JANUARY 1978 level: I

skill title: NAMING PARTS OF VALVE PORTS

developed & written by: ALAN STEINBERG

visuals by: DAVE WEHRWEIN

WORD GUIDE

DIAGRAMS - DRAWINGS OF HOW SOMETHING LOOKS OR FITS TOGETHER.

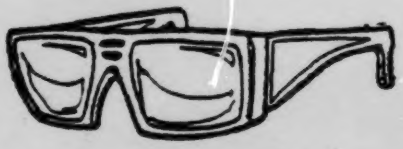
PERFORMANCE OBJECTIVE

YOU ARE GOING TO LEARN:

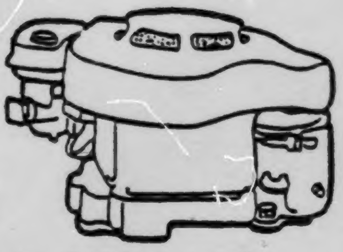
HOW TO NAME THE PARTS OF VALVE PORTS.

AND IN ORDER TO DO THIS YOU WILL NEED:

DIAGRAMS



SAFETY GLASSES



AN ENGINE HEAD

WE WILL KNOW YOU CAN DO IT WHEN:

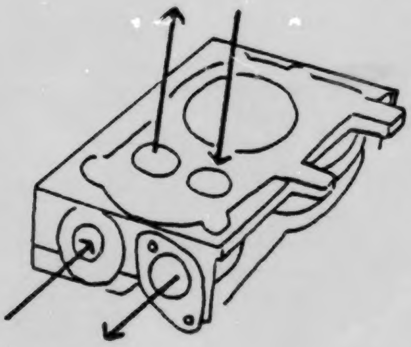
YOU HAVE ALL YOUR EQUIPMENT.

YOU CAN NAME ALL THE PARTS OF VALVE PORTS TO YOUR INSTRUCTOR.

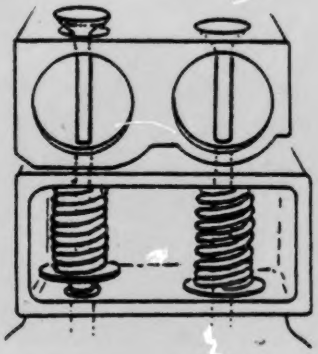
"TURN THE PAGE"

INFORMATION

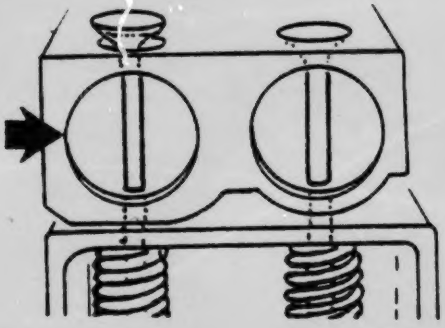
A - THIS PICTURE SHOWS THE INTAKE AND EXHAUST VALVES ON THE SIDE OF THE PISTON.



B - HERE IS THE VALVE IN THE CYLINDER BLOCK.



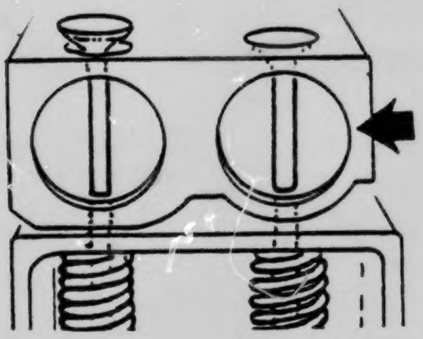
C - THE INTAKE VALVE PORT IS THE HOLE THAT THE AIR-FUEL MIXTURE GOES THROUGH TO GET INTO THE COMBUSTION CHAMBER.



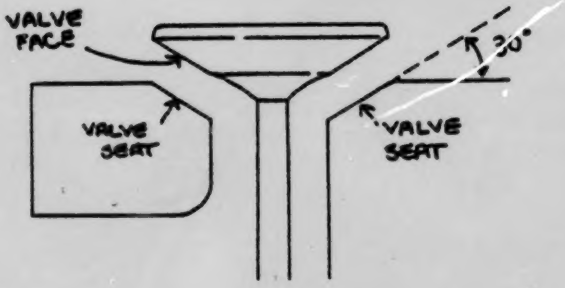
"TURN THE PAGE"

INFORMATION

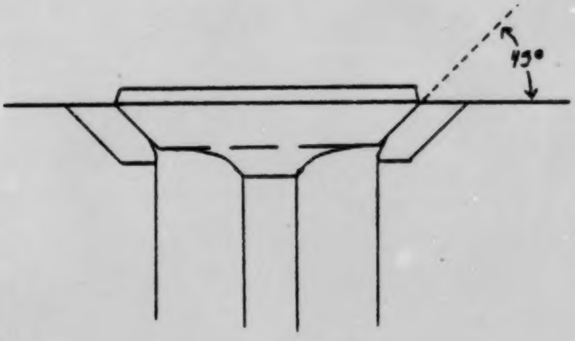
D - THE EXHAUST VALVE PORT IS THE HOLE THE EXHAUST GOES THROUGH FROM THE CYLINDER TO THE MUFFLER.



E - THE VALVE SEAT IS WHERE THE FACE OF THE VALVE HITS THE PORT TO CLOSE THE VALVE.


VALVE FACE
30°
VALVE SEAT
VALVE SEAT

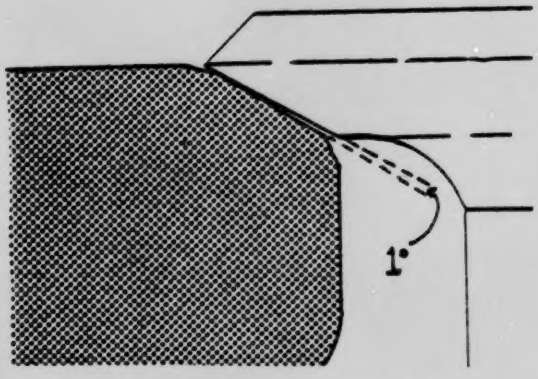
F - THE VALVE SEAT (ABOVE) IS GROUND ON A 30° ANGLE. SOME VALVE SEATS ARE GROUND ON A 45° ANGLE.



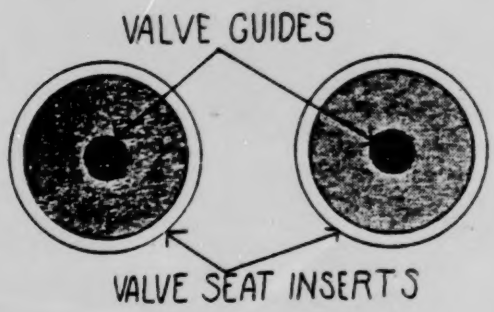
"TURN THE PAGE"

INFORMATION

G - ON SOME VALVES AND PORTS, THERE IS A 1° DIFFERENCE BETWEEN THE SEAT AND VALVE FACE. THIS HELPS THE VALVES TO SEAT FASTER.



H - THE VALVE GUIDE IS AT THE CENTER OF THE VALVE CHAMBER AND HOLDS THE VALVE IN PLACE.

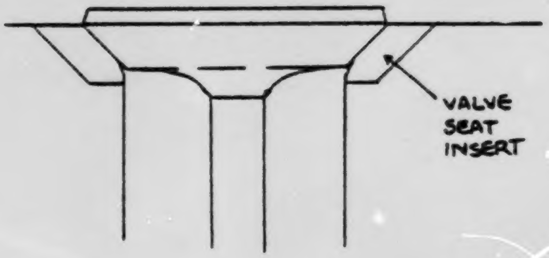


I - SOME VALVE SEATS HAVE INSERTS. THE INSERT IS MADE OF HARDER METAL TO HELP THE HEAD LAST LONGER WHEN IT IS PRESSED INTO THE HEAD.

"TURN THE PAGE"

INFORMATION

J - THE VALVE SEAT IS GROUND ON THE INSERT, NOT THE HEAD. THE INSERT CAN BE RE-GROUND OR CHANGED IF WORN OR BROKEN.

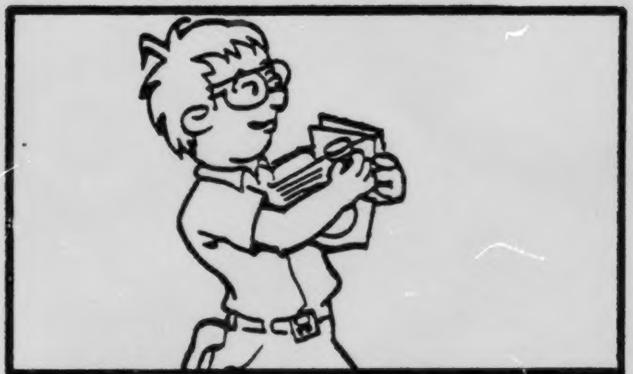

VALVE
SEAT
INSERT

"TURN THE PAGE"

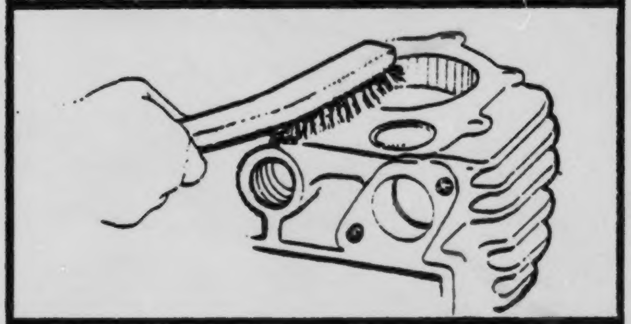
JOB STEPS

READ: LOOK:

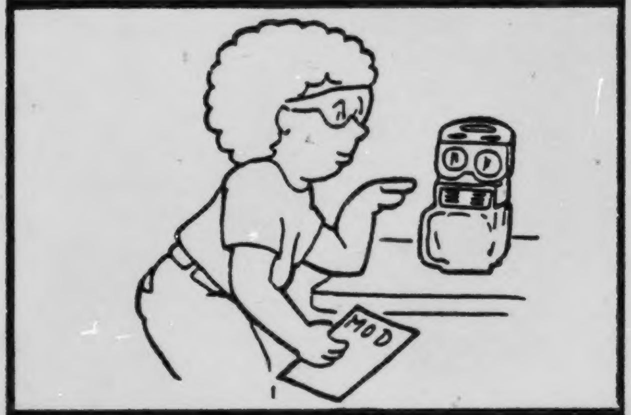
1. GET ALL EQUIPMENT AND TAKE IT TO YOUR WORK AREA. →



2. CLEAN LOOSE DIRT AND GREASE OFF THE ENGINE HEAD. USE CLEANING SOLVENT AND A FINISH. WEAR YOUR SAFETY GLASSES. →



3. PRACTICE FINDING THE PARTS OF THE VALVE PORTS. →



4. WHEN YOU THINK YOU KNOW THEM, SHOW THE VALVE PORT PARTS TO YOUR INSTRUCTOR. →

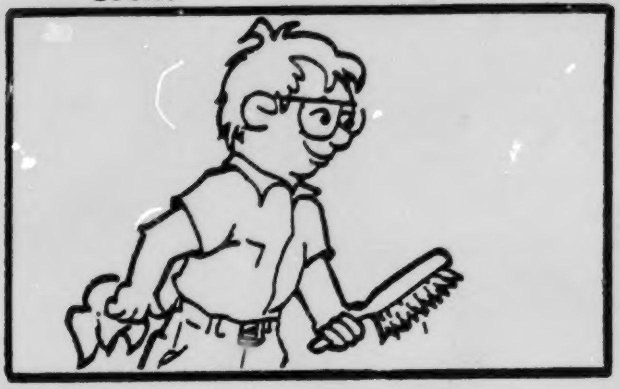
"TURN THE PAGE"

JOB STEPS

READ:

5. CLEAN UP YOUR WORK AREA AND PUT AWAY THE ENGINE HEAD. →

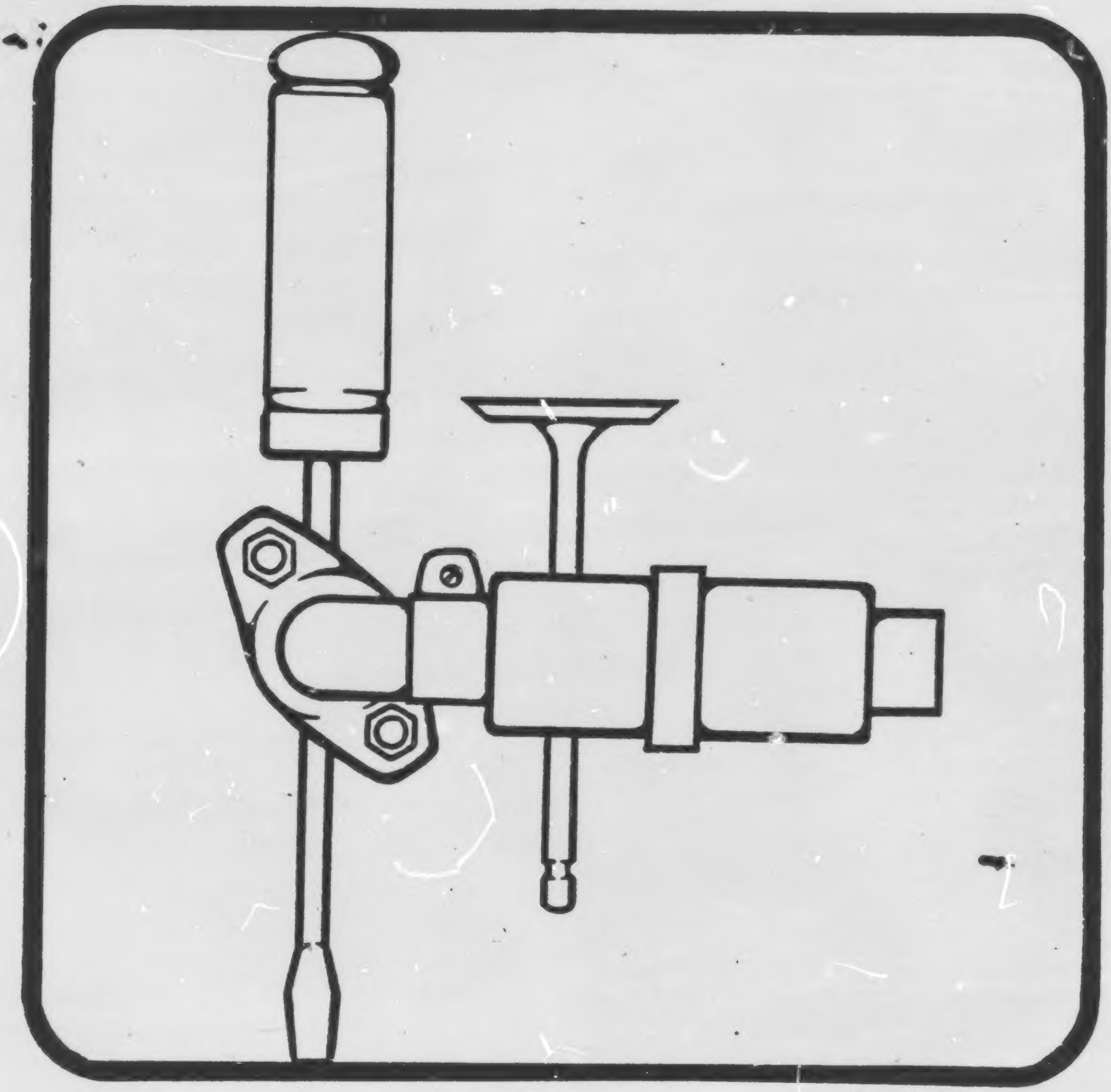
LOOK:



CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU:

1. KNOW ALL PARTS OF VALVE PORTS.
2. HAVE CLEANED UP YOUR WORK AREA.

"TURN THE PAGE"



small engine repair

unit: ENGINE BLOCK

capital area career center

module: 7501 24 005 1
7501 24 005 3 date: OCTOBER 1977 level: I

skill title: REPAIR VALVE GUIDES ON CLINTON OR TECUMSEH ENGINE

developed & written by: DEBI WHITE

visuals by: DAVE WEHRWEIN

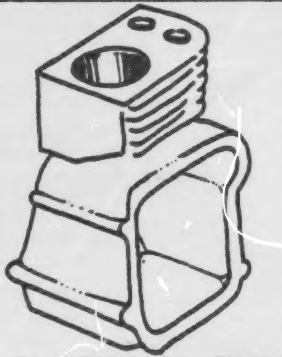
PERFORMANCE OBJECTIVE

YOU ARE GOING TO LEARN:

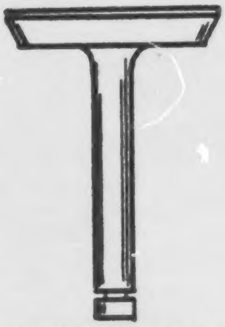
HOW TO REAM THE VALVE GUIDE AND INSTALL THE VALVE ON 2 KINDS OF ENGINES.

1. CLINTON ENGINE
2. TECUMSEH ENGINE

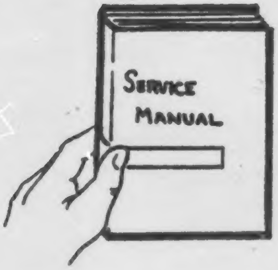
AND IN ORDER TO DO THIS YOU WILL NEED:



BARE CLINTON OR TECUMSEH BLOCK



OVERSIZE VALVE



SERVICE MANUAL

REAMER FOR THE OVERSIZE VALVE

SAFETY GLASSES

WE WILL KNOW YOU CAN DO IT WHEN:

1. YOU READ THE MODULE.
2. YOU GET YOUR EQUIPMENT.
3. YOU DO THE JOB STEPS FOR REPAIRING VALVE GUIDES ON CLINTON AND TECUMSEH ENGINES.

"TURN THE PAGE"

WORD GUIDE

BRONZE - A KIND OF METAL.

JOB STEPS

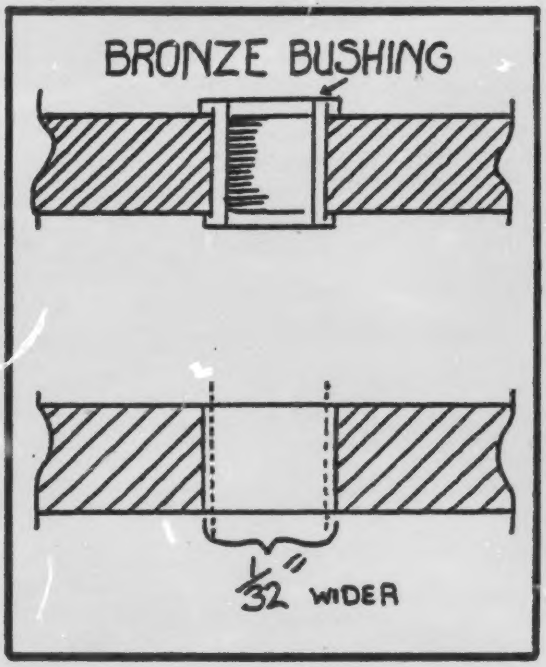
READ:

LOOK:

1. TECUMSEH AND CLINTON ENGINES ARE DIFFERENT FROM BRIGGS AND STRATTON ENGINES.

NOTE: BRIGGS AND STRATTON ENGINES - YOU REAM OUT THE OLD VALVE GUIDE AND INSTALL A NEW BRONZE BUSHING.

TECUMSEH AND CLINTON ENGINES - WHEN VALVE GUIDES ARE WORN, YOU REAM THE OLD GUIDE 1/32" OVERSIZE. THEN YOU INSTALL A VALVE WITH AN OVERSIZE VALVE STEM.



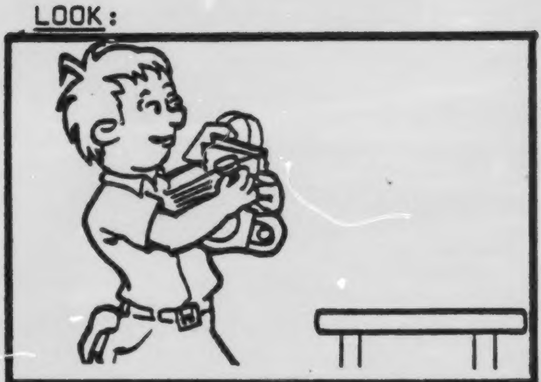
CHECK:
1. TELL YOUR INSTRUCTOR 2 WAYS TO REPAIR VALVE GUIDES.
2. TELL YOUR INSTRUCTOR WHICH ENGINES WILL NEED NEW BUSHINGS.
3. TELL YOUR INSTRUCTOR WHICH ENGINES WILL NEED A NEW VALVE WITH AN OVERSIZE VALVE STEM.

"TURN THE PAGE"

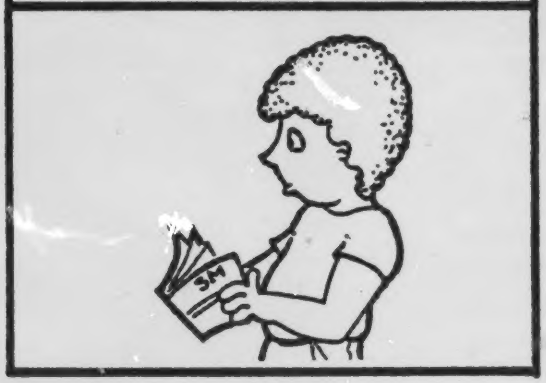
JOB STEPS

READ: LOOK:

2. GET ALL OF YOUR EQUIPMENT. TAKE YOUR EQUIPMENT TO YOUR WORK AREA.



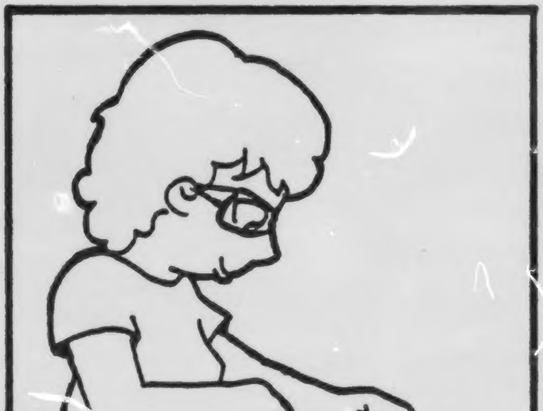
3. GET THE RIGHT OVERSIZE VALVE STEM REAMER. CHECK THE MANUAL TO FIND OUT WHAT SIZE YOU WILL NEED.



CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

1. ALL YOUR EQUIPMENT.
2. THE RIGHT OVERSIZE VALVE STEM REAMER.

4. CLAMP THE BLOCK ON TO THE BENCH.

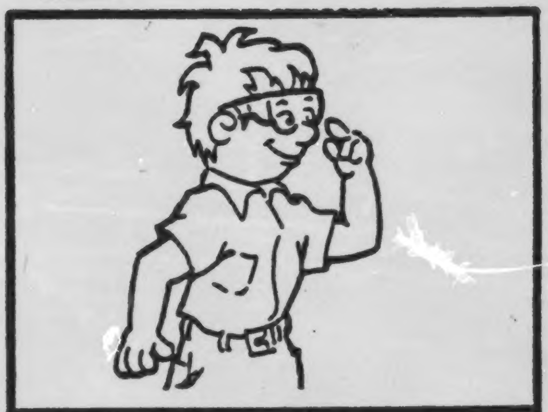


"TURN THE PAGE"

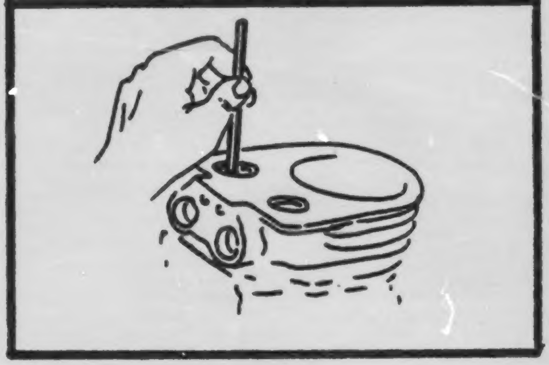
JOB STEPS

READ: LOOK:

5. PUT ON SAFETY GLASSES.



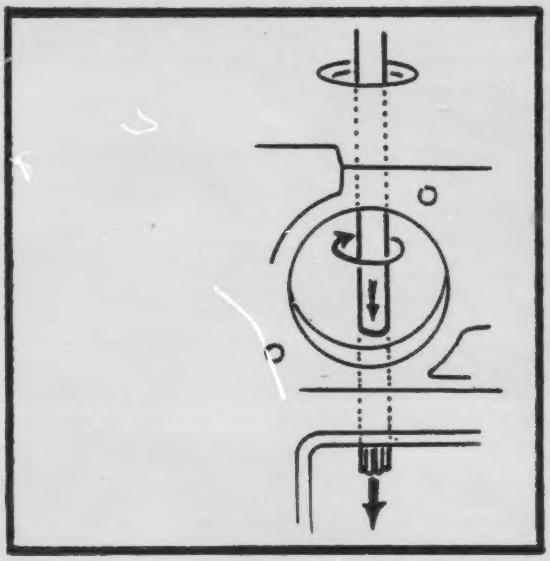
6. PUT REAMER IN THE WORN VALVE GUIDE SO THAT IT IS STRAIGHT. BE SURE IT IS STRAIGHT.



CHECK: ASK YOUR INSTRUCTOR TO:

1. CHECK THAT THE BLOCK IS CLAMPED.
2. CHECK THAT YOU HAVE ON SAFETY GLASSES.
3. WATCH YOU PUT IN THE REAMER SO IT IS STRAIGHT.

7. TURN REAMER TO THE RIGHT AND PUSH DOWN. THEN, REAM ALL THE WAY THROUGH THE GUIDE.



"TURN THE PAGE"

WORD GUIDE

COMPRESSED - UNDER PRESSURE.

JOB STEPS

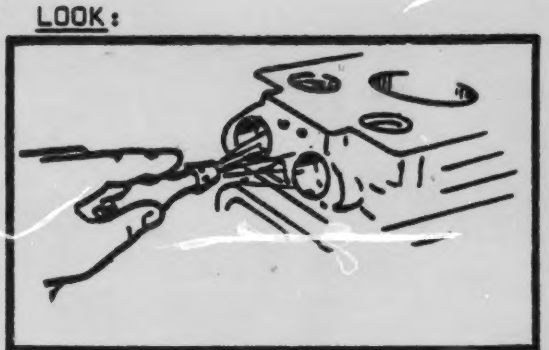
CHECK: ASK YOUR INSTRUCTOR TO WATCH YOU WORK.

READ:

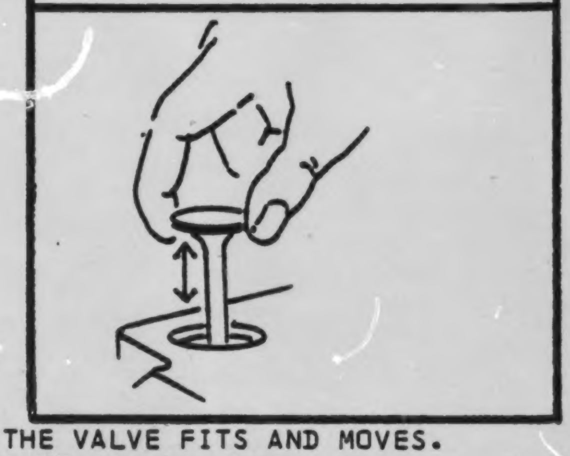
LOOK:

8. NOW, BLOW THE METAL CHIPS OUT WITH COMPRESSED AIR.

CAUTION: BE SURE YOU HAVE YOUR SAFETY GLASSES ON.

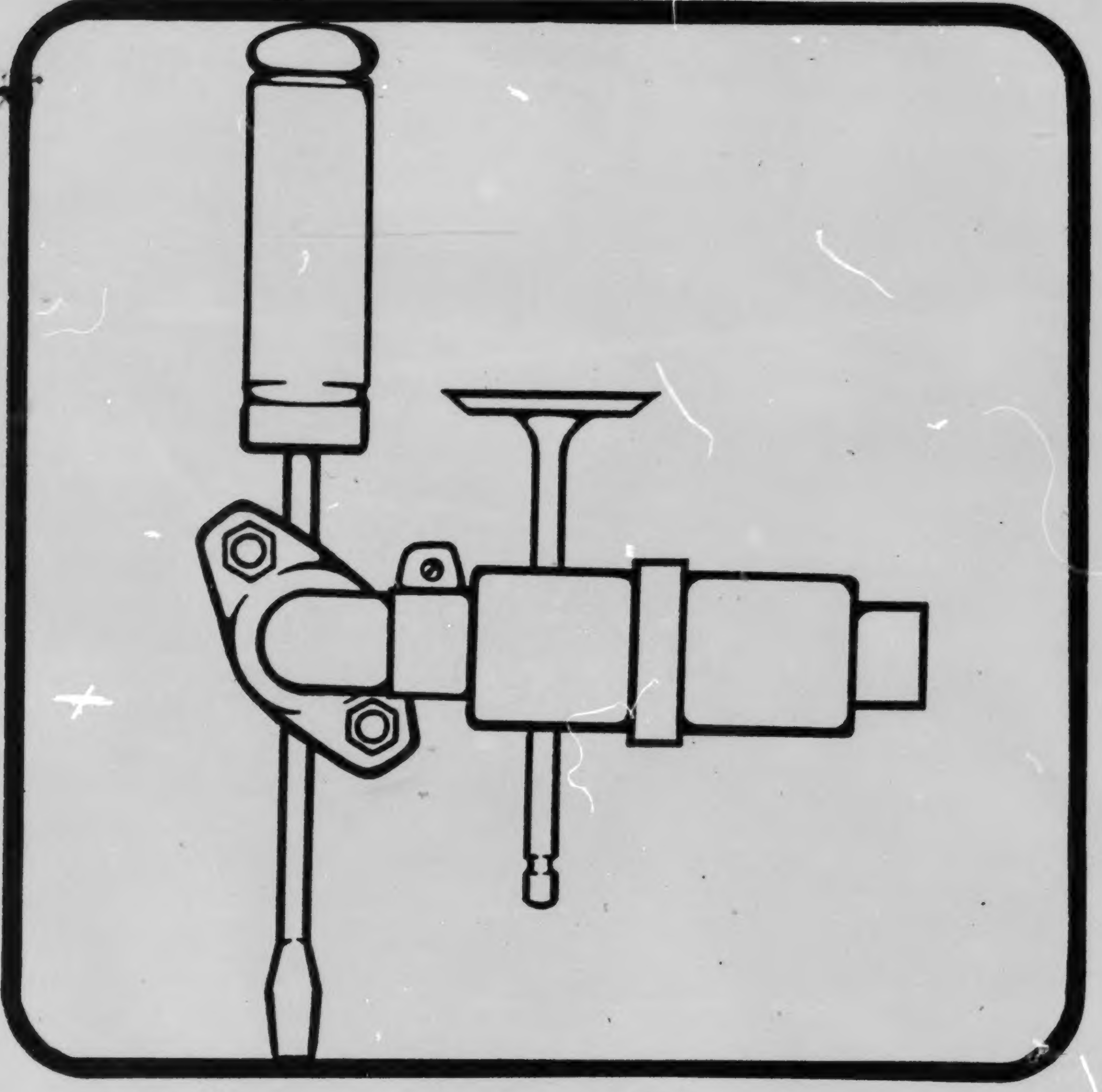


9. PUT THE OVERSIZE VALVE IN THE GUIDE. MOVE IT UP AND DOWN- -DOES IT MOVE EASILY?



CHECK: SHOW YOUR INSTRUCTOR HOW THE VALVE FITS AND MOVES. THE VALVE SEAT MAY HAVE TO BE GROUND. YOUR INSTRUCTOR WILL SHOW YOU HOW TO DO THIS.

10. PUT ALL OF YOUR EQUIPMENT AWAY.



small engine repair

unit: ENGINE BLOCK

capital area career center

module: 7501 24 006 1
7501 24 006 3 date: OCTOBER 1977 level: ______

skill title: INSTALL VALVE GUIDES IN ALUMINUM BLOCK

BRIGGS AND STRATTON

developed & written by: DEBI WHITE

visuals by: DAVE WEHRWEIN

WORD GUIDE

REAM - OPEN OR SHAPE A HOLE.

INSTALL - PUT IN.

PERFORMANCE OBJECTIVE

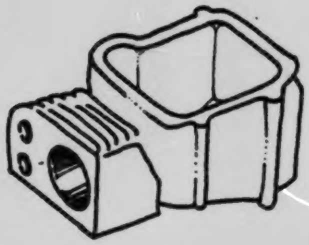
YOU ARE GOING TO LEARN:

HOW TO CHECK A VALVE GUIDE.

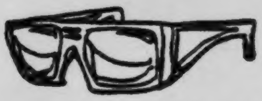
HOW TO REAM OUT A WORN VALVE GUIDE.

HOW TO INSTALL AND FINISH-REAM A NEW VALVE GUIDE.

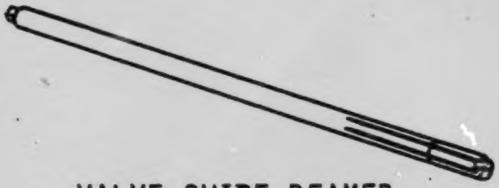
AND IN ORDER TO DO THIS YOU WILL NEED:



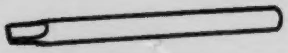
BARE BRIGGS BLOCK



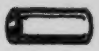
SAFETY GLASSES



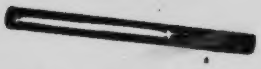
VALVE GUIDE REAMER



VALVE GUIDE PLUG GAUGE



BUSHING



VALVE GUIDE FINISH-REAMER

WE WILL KNOW YOU CAN DO IT WHEN:

YOU READ THE MODULE.

GET YOUR EQUIPMENT.

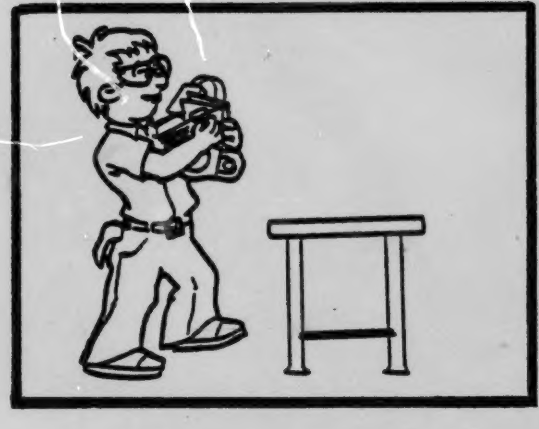
DO THE JOB STEPS TO INSTALL A VALVE GUIDE.

"TURN THE PAGE"

JOB STEPS

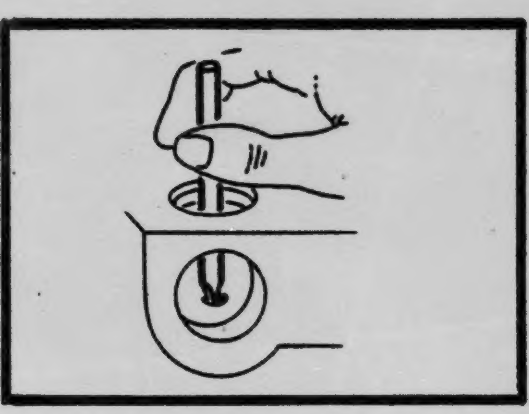
READ: LOOK:

1. GET ALL OF YOUR EQUIPMENT. TAKE YOUR EQUIPMENT TO YOUR WORK AREA.



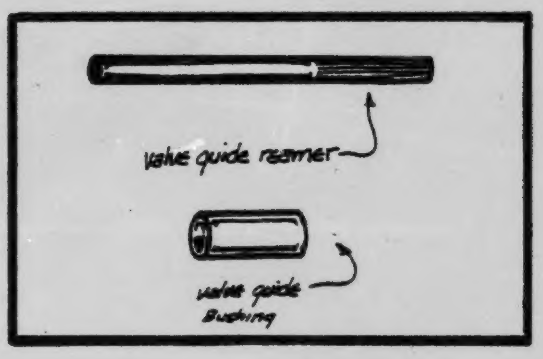
2. PUT THE PLUG GAUGE IN THE HOLE AS FAR AS IT WILL GO WITHOUT PUSHING ON IT.

NOTE: IF THE PLUG GAUGE GOES IN 5/16", YOU WILL HAVE TO REBUSH THE VALVE GUIDE. WEAR YOUR SAFETY GLASSES.



CHECK: TELL YOUR INSTRUCTOR IF THE GUIDE NEEDS TO BE REBUSHED. THEN SHOW HOW MUCH YOU MEASURED.

3. CHOOSE A VALVE GUIDE REAMER THE SAME SIZE AS THE BUSHING.



CHECK: SHOW YOUR INSTRUCTOR THE REAMER SIZE YOU HAVE CHOOSEN.

"TURN THE PAGE"

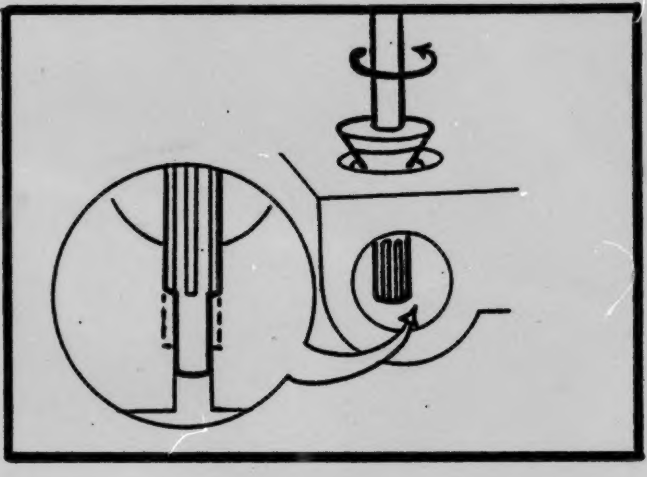
JOB STEPS

READD:

LOOK:

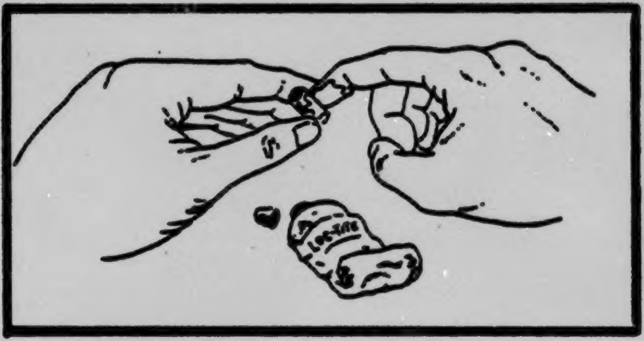
4. REAM OUT THE GUIDE 1/16" DEEPER THAN THE LENGTH OF THE BUSHING. DO NOT REAM THROUGH THE GUIDE.

NOTE: WET WITH KEROSENE.



5. GET YOUR VALVE GUIDE DRIVER AND HAVE REAMED NEW BUSHING.

6. PUT LOCKTITE ON THE OUTSIDE OF BUSHING.



CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

1. THE RIGHT VALVE GUIDE DRIVER AND BUSHING.
2. PUT LOCKTITE ON THE OUTSIDE OF BUSHING.

"TURN THE PAGE"

WORD GUIDE

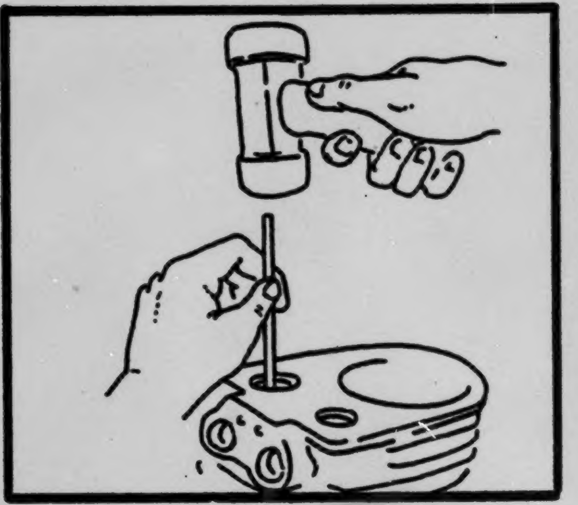
BOTTOMS - TOUCHES THE BOTTOM.

JOB STEPS

READ:

LOOK:

7. DRIVE IN THE BUSHING UNTIL IT BOTTOMS ON THE REAMED HOLE. USE A BRASS HAMMER. TAP GENTLY.

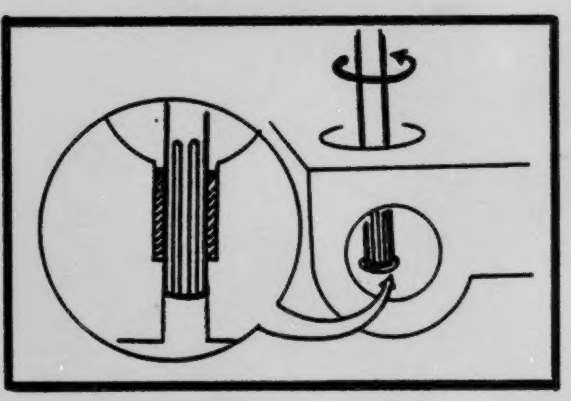


8. GET THE FINISH REAMER.

CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT:

1. THE NEW BUSHING IS SET INTO REAMED HOLE.
2. YOU HAVE THE RIGHT FINISH REAMER.

9. FINISH REAM THE NEW BUSHING.



"TURN THE PAGE"

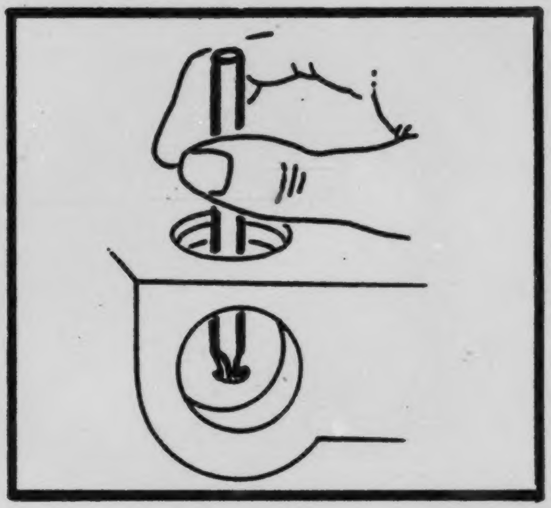
JOB STEPS

READ:

LOOK:

10. CHECK THE NEW GUIDE BUSHING WITH A PLUG GUAGE.

→



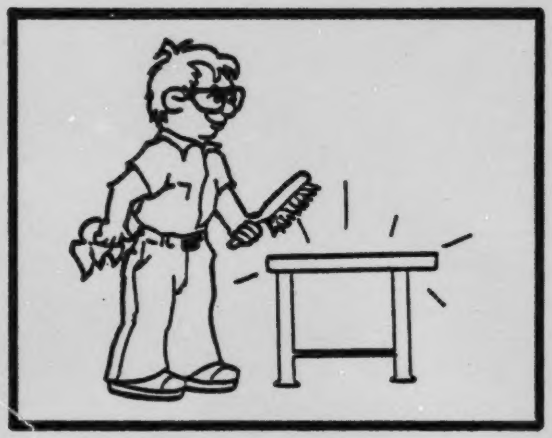
11. ASK YOUR INSTRUCTOR TO SHOW YOU HOW TO GROUND AND LAP THE VALVE SEAT.

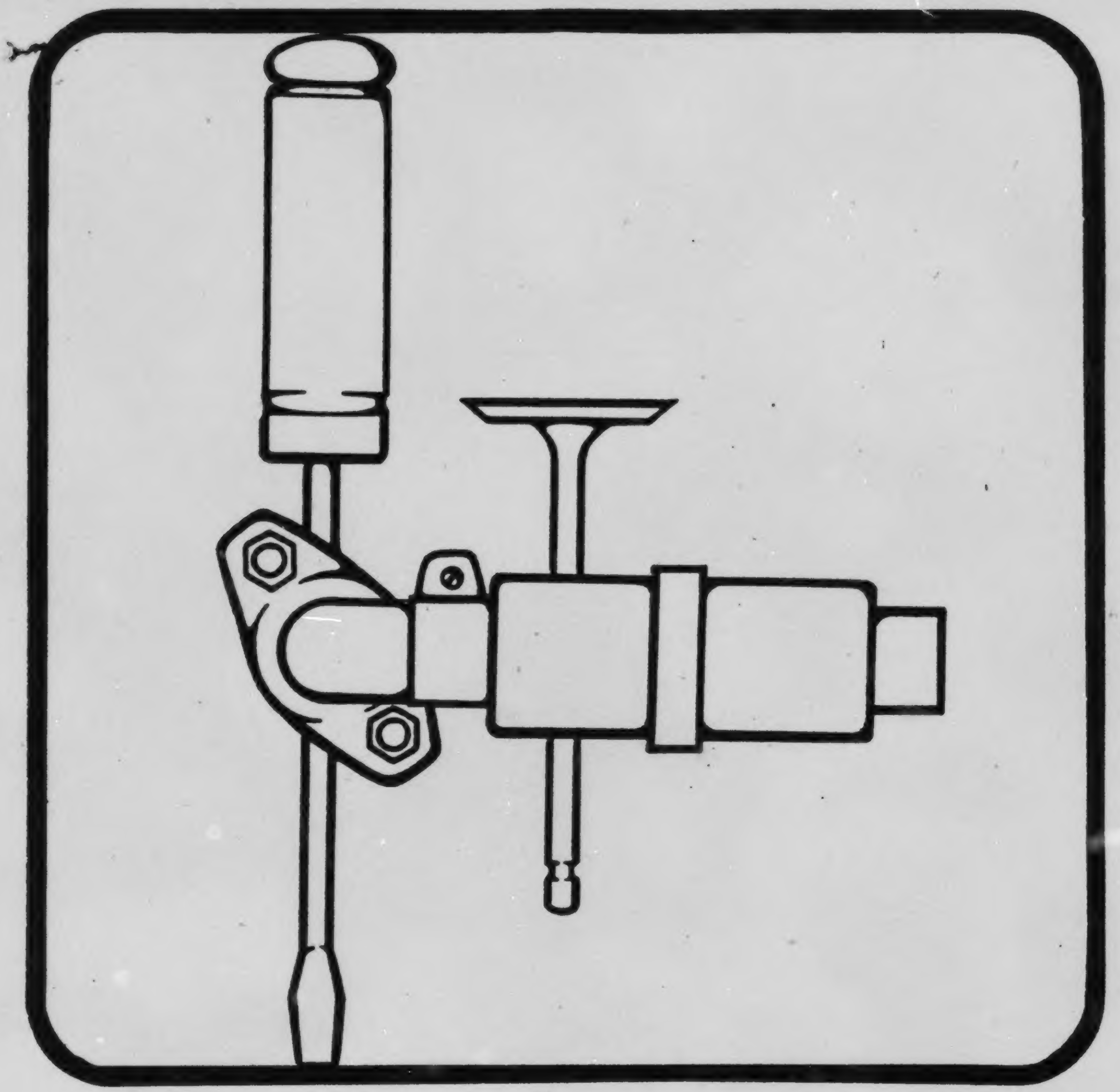
CHECK: WATCH YOUR INSTRUCTOR. LISTEN CAREFULLY.

12. ASK YOUR INSTRUCTOR TO CHECK ALL OF YOUR WORK. REPEAT THIS MODULE IF YOU NEED TO.

13. PUT ALL YOUR EQUIPMENT AWAY. CLEAN YOUR WORK AREA.

→





small engine repair

unit: ENGINE BLOCK

capital area career center

module: 7501 24 007 1
7501 24 007 3 date: OCTOBER 1977 level:

skill title: REMOVE AND REPLACE VALVE GUIDES IN CAST IRON BRIGGS & STRATTON ENGINE

developed & written by: D. CONSTANTINI

visuals by: DAVE WEHRWEIN

WORD GUIDE

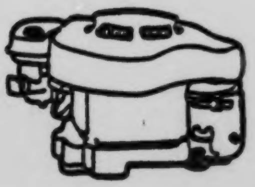
REPLACEMENT - TO RESTORE TO A FORMER PLACE OR TO PUT IN PLACE OF

PERFORMANCE OBJECTIVE

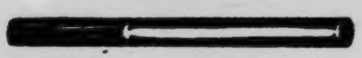
YOU ARE GOING TO LEARN:

HOW TO TAKE OUT WORN VALVE GUIDES.
HOW TO PUT BACK AND REAM GUIDES IN A CAST IRON BRIGGS & STRATTON ENGINE

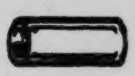
AND IN ORDER TO DO THIS YOU WILL NEED:



4-CYCLE ENGINE BLOCK



VALVE GUIDE REAMER



REPLACEMENT VALVE GUIDE

SAFETY GLASSES

WE WILL KNOW YOU CAN DO IT WHEN:

1. YOU HAVE GATHERED ALL YOUR EQUIPMENT.
2. YOU HAVE WORKED ON THE VALVES SO THAT YOUR ENGINE RUNS ACCORDING TO SERVICE MANUAL SPECIFICATIONS.

"TURN THE PAGE"

WORD GUIDE

NOMENCLATURE - NAMES (OF SOMETHING)

INFORMATION

READ THE FOLLOWING MATERIAL IN BRIGGS & STRATTON REPAIR INSTRUCTIONS MANUAL IV:

SECTION 6:

A. "REBUILDING VALVE GUIDES TO ORIGINAL DIAMETER"

B. "VALVE NOMENCLATURE AND CONSTRUCTION"

"TURN THE PAGE"

WORD GUIDE

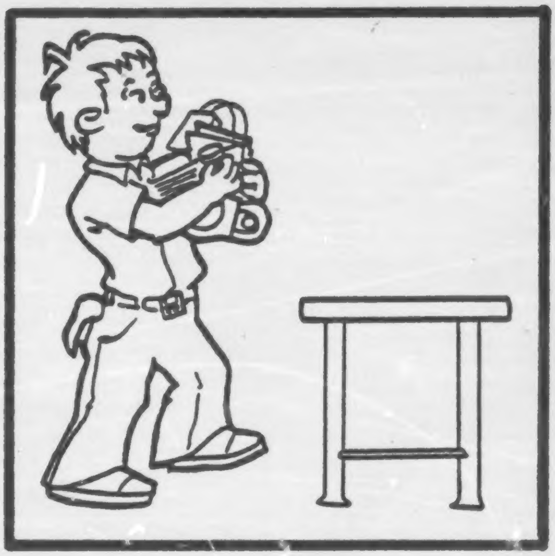
→ **REPLACE** - TO RESTORE SOMETHING TO FORMER PLACE OR PUT IN PLACE OF

JOB STEPS

READ: LOOK:

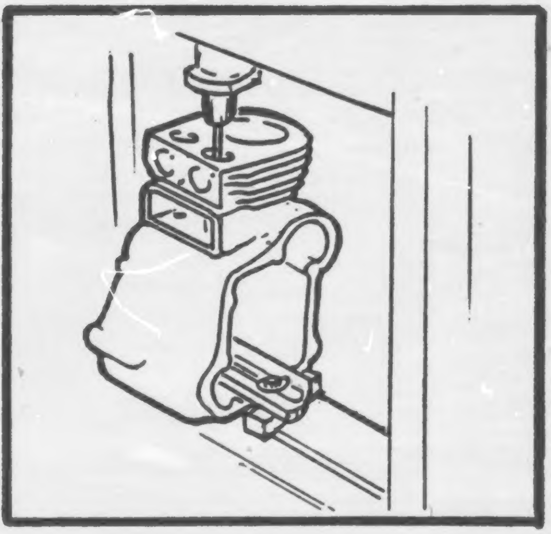
THINK SAFETY! **WORK SAFELY!** **WEAR YOUR SAFETY GLASSES!**

1. GET ALL EQUIPMENT AND TAKE IT TO YOUR WORK AREA.



2. CHECK THE PARTS MANUAL AND SERVICE INSTRUCTIONS FOR FACTS ON HOW TO REPLACE VALVE GUIDES. IF YOU DO NOT HAVE ANY GUIDES OR OVER-SIZE VALVES, SCRAPE THE BLOCK.

3. PLACE BLOCK IN THE ARBOR PRESS.



"TURN THE PAGE"

WORD GUIDE

DIAMETER - DISTANCE FROM END TO END OF STRAIGHT LINE PASSING THROUGH CENTER OF A CIRCLE

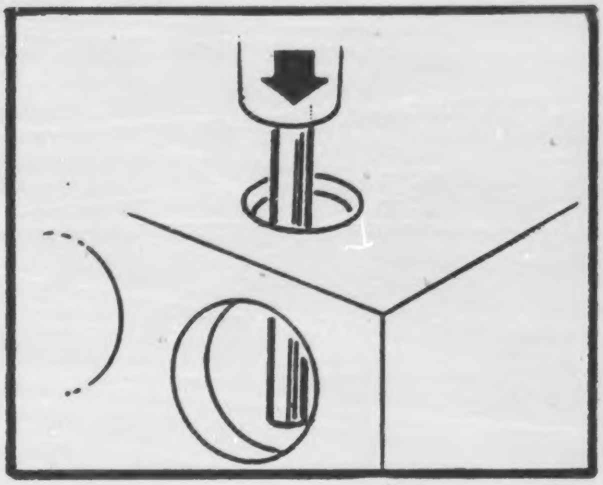
BOTTOMS OUT - HITS BOTTOM OF HOLE

READ:

LOOK:

4. USING VALVE GUIDE DRIVER, WORK FROM TOP TO BOTTOM AND PRESS GUIDE FROM BLOCK.

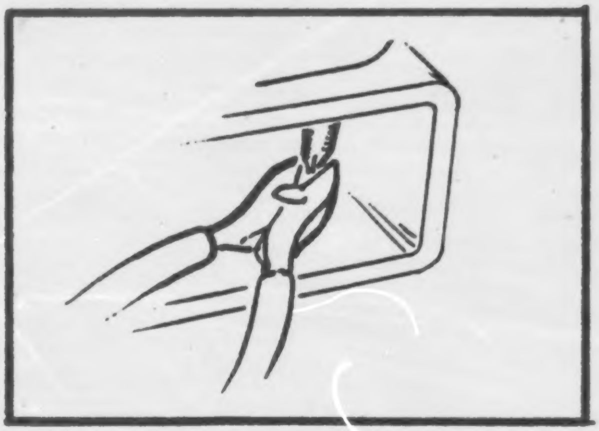
NOTE: WATCH GUIDE THROUGH BREATHER CHAMBER AS IT PASSES DOWNWARD.



CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

1. ALL EQUIPMENT.
2. CHECKED YOUR SERVICE MANUAL FOR INSTRUCTION.
3. SCRAPED THE BLOCK IF YOU DON'T HAVE GUIDES OR OVER-SIZE VALVES.
4. CORRECTLY PLACED BLOCK IN ARBOR PRESS.
5. PRESSED GUIDE FROM BLOCK, WORKING FROM TOP TO BOTTOM.
6. WATCHED GUIDE THROUGH BREATHER CHAMBER.

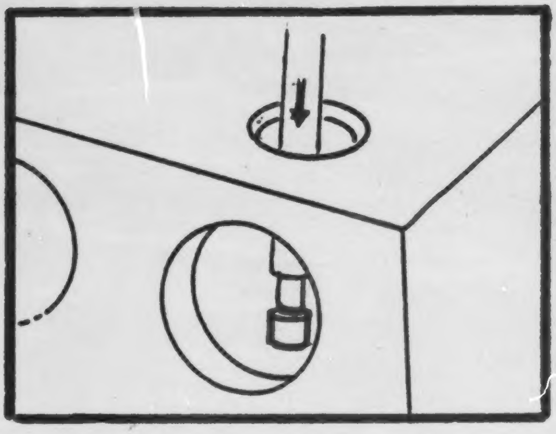
5. IF DIAMETER OF TAPPET HOLE IS SMALLER THAN LENGTH OF GUIDE, USE PLIERS TO BREAK OFF PARTS OF GUIDE BEFORE GUIDE BOTTOMS OUT.



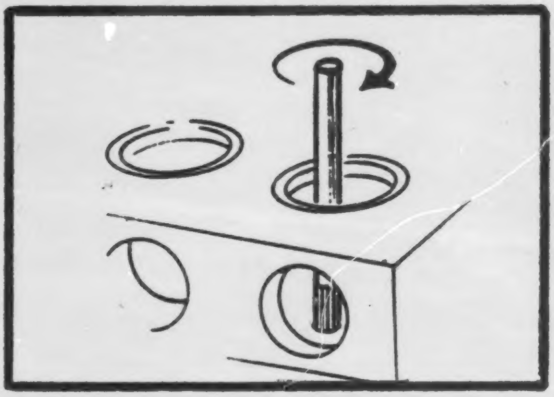
"TURN THE PAGE"

READ: LOOK:

6. PUT VALVE GUIDE IN BLOCK AND PRESS INTO PLACE. (TO HELP YOU WITH THIS STEP, PRE-HEAT BLOCK TO 180°F AND CHILL VALVE GUIDE)

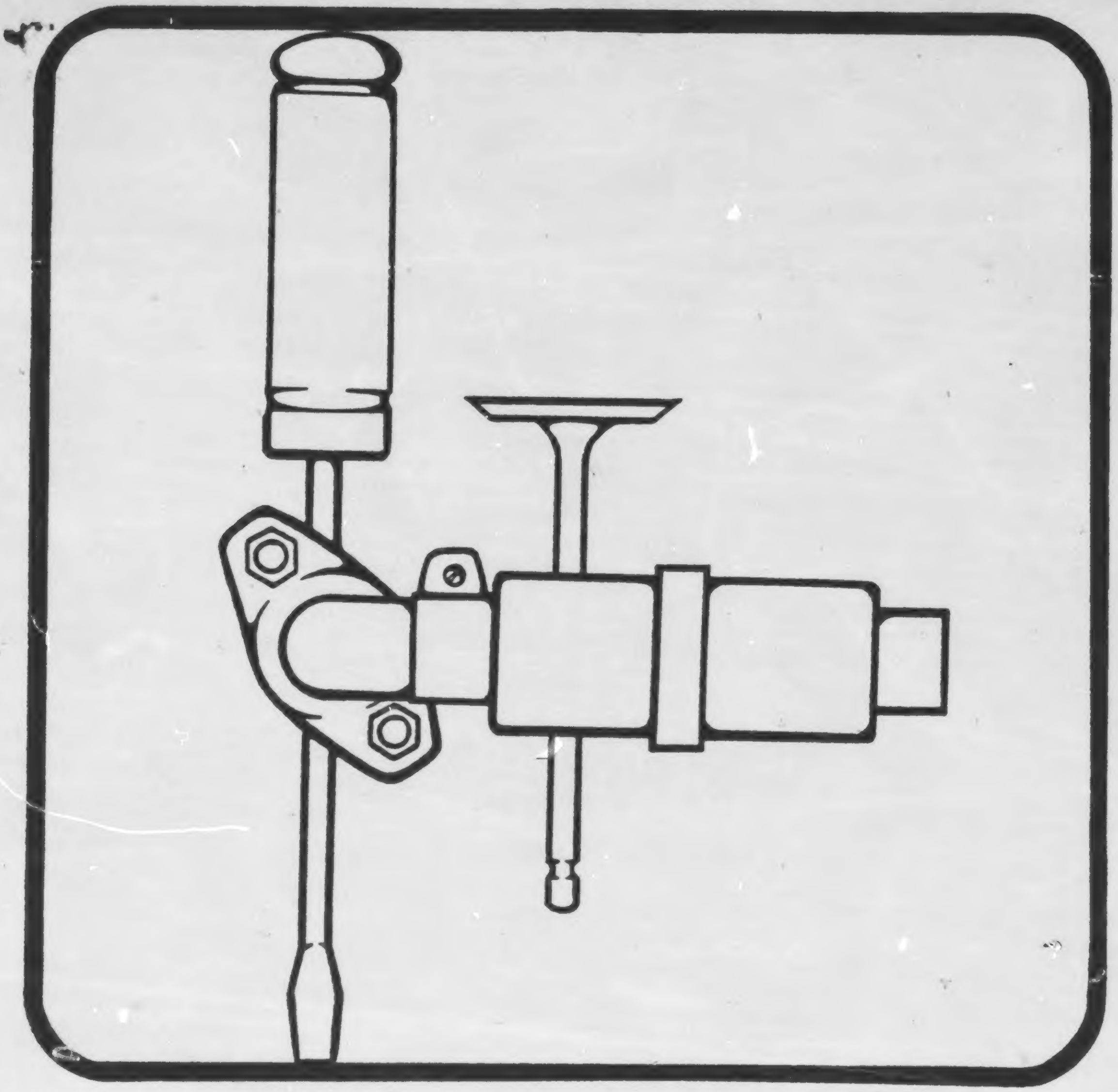


7. USE THE CORRECT REAMER AND REAM GUIDE TO FIT.



CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

1. USED PLIERS TO BREAK OFF PARTS OF GUIDE, IF NECESSARY.
2. PRESSED VALVE GUIDE INTO PLACE.
3. REAMED GUIDE TO FIT.



small engine repair

unit: VALVES

capital area career center

module: 7501 24 010 1
7501 24 010 3 date: MAY 1978 level: III

skill title: SERVICE VALVES

developed & written by: DON FOSTER & JACK HELDER

visuals by: DAVE WEHRWEIN

WORD GUIDE

"BLOW-BY" - AIR COMPRESSION BLOWING BY WORN RINGS OR BURNED VALVES

PERFORMANCE OBJECTIVE

YOU ARE GOING TO LEARN:

1. HOW TO REMOVE VALVES AND SPRINGS
2. HOW TO CHECK VALVE SEATS.
3. HOW TO CHECK VALVE STEMS AND FACE FOR WEAR AND BURNING.
4. HOW TO REPLACE VALVES
5. HOW TO SET TAPPET CLEARANCE.

AND IN ORDER TO DO THIS YOU WILL NEED:

4-CYCLE ENGINE

CYCLE SET

SCREWDRIVER SET

VALVE SPRING COMPRESSOR

VALVE SEAT CUTTER

FEELER GAUGE

MICROMETER

LAPPING COMPOUND

SAFETY GLASSES

"TURN THE PAGE"

WE WILL KNOW YOU CAN DO IT WHEN:

YOU HAVE SERVICED THE VALVES SO WELL THAT THERE ARE NO "BLOW-BYS" AND THE VALVES WORK AS THEY SHOULD.

"TURN THE PAGE"

JOB STEPS

READ: LOOK:

1. GET ALL THE TOOLS YOU WILL NEED. PUT ON YOUR SAFETY GLASSES.

2. REMOVE THE CYLINDER HEAD.

3. IF YOUR ENGINE IS A CLINTON OR TECUMSEH, REMOVE THE CARBURETOR AND MANIFOLD.

NOTE: FOR BRIGGS AND STRATTON ENGINES, IT IS ON THE OTHER SIDE AND YOU DO NOT REMOVE IT.

4. REMOVE THE VALVE BREATHER ASSEMBLY.

"TURN THE PAGE"

JOB STEPS

READD: LOOK:

5. USING THE SPRING COMPRESSOR, COMPRESS THE VALVE SPRINGS.

6. REMOVE THE VALVE KEEPER:

   A. OLD TYPE BRIGGS AND TECUMSEH: PIN TYPE RETAINER

   B. NEW TYPE BRIGGS AND TECUMSEH: RETAINER ONLY, WITH A NOTCHED VALVE STEM

   C. CLINTON ENGINES: HORSESHOE TYPE

   D. LARGER HORSEPOWER ENGINES: MOST HAVE SPLIT TYPE RETAINERS

CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:
1. REMOVED THE VALVE SPRINGS.
2. REMOVED THE VALVE KEEPERS.
3. YOUR SAFETY GLASSES ON.

"TURN THE PAGE"

JOB STEPS

READ: LOOK:

7. USING A WIRE BRUSH ON THE GRINDER, CLEAN THE VALVES.

NOTE: BE SURE TO WEAR SAFETY GLASSES. CLEAN OFF ALL CARBON.

8. CHECK VALVE GUIDES.

9. GRIND THE VALVES. ASK YOUR INSTRUCTOR TO SHOW YOU HOW.

CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

1. CLEANED THE VALVES.
2. CHECKED THE VALVE GUIDES.
3. GROUND THE VALVES.

"TURN THE PAGE"

JOB STEPS

READ: LOOK:

10. USING THE NUWAY VALVE-SEAT CUTTER, RE-CUT THE VALVE SEATS. CHECK THE MANUAL FOR SPECS.

11. PUT A SMALL AMOUNT OF LAPPING COMPOUND ON VALVE FACES. DO NOT GET ANY ON THE VALVE STEM, IT WOULD WEAR OUT THE VALVE.

CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

1. RE-CUT THE VALVE SEATS TO MANUAL SPECS.
2. PUT LAPPING COMPOUND ON VALVE FACES.

12. PUT VALVES BACK IN THE SAME HOLES THEY CAME FROM.

"TURN THE PAGE"

JOB STEPS

READ:

LOOK:

13. USING THE VALVE LAPPING TOOL, TURN THE VALVES BACK AND FORTH. DO NOT TURN IT ALL THE WAY AROUND.

14. TAKE THE VALVES OUT OF THE HOLES.

15. CLEAN ALL LAPPING COMPOUND OFF VALVE SEATS AND VALVES.

"TURN THE PAGE"

JOB STEPS

READ: LOOK:

16. CHECK YOUR WORK. THERE SHOULD BE A DULL, EVEN, SMOOTH RING AROUND THE VALVE FACE.

CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

1. LAPPED THE VALVES SO THERE IS A DULL, EVEN, SMOOTH RING ON VALVE FACE.
2. CLEANED UP ALL LAPPING COMPOUND.

17. PUT VALVES BACK INTO ENGINE (DO NOT HOOK UP SPRINGS).

18. ROTATE ENGINE TO TDC (TOP DEAD CENTER) OF COMPRESSION STROKE.

"TURN THE PAGE"

JOB STEPS

READ: LOOK:

19. USE FEELER GAUGE TO CHECK TAPPET CLEARANCES. LOOK IN MANUAL TO FIND SPECS.

20. IF TAPPET CLEARANCE IS TOO SMALL, REMOVE VALVE.

21. GRIND VALVE STEM ON GRINDER. TAKE OFF ONLY A TINY BIT AT A TIME (.001 - .0015 INCH AT A TIME).

CHECK: HAVE YOUR INSTRUCTOR CHECK THE VALVE TAPPET CLEARANCE ON YOUR VALVES.

"TURN THE PAGE"

JOB STEPS

READ: LOOK:

22. WHEN VALVE TAPPET CLEARANCES ARE RIGHT, PUT VALVE SPRINGS ON VALVES.

23. USE THE VALVE SPRING COMPRESSOR TO COMPRESS VALVE SPRING.

24. PUT KEEPER ON VALVE.

25. DO THE OTHER VALVE.

CHECK: ASK YOUR INSTRUCTOR CHECK THE VALVES AND SPRINGS YOU HAVE PUT BACK IN.

"TURN THE PAGE"

JOB STEPS

READ: LOOK:

26. PUT ON VALVE CHAMBER BREATHER ASSEMBLY. USE NEW GASKET.

27. PUT ON NEW HEAD GASKET, IF NEEDED. ASK YOUR INSTRUCTOR.

CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

1. PUT ON VALVE CHAMBER BREATHER ASSEMBLY.
2. PUT ON NEW HEAD GASKET, IF NEEDED.

28. PUT HEAD BACK ON ENGINE.

"TURN THE PAGE"

JOB STEPS

READD: LOOK:

29. USE A TORQUE WRENCH TO TORQUE DOWN HEAD BOLTS. SEE MANUAL OR INSTRUCTOR FOR SPECS.

30. IF THE ENGINE IS A TECUMSEH OR CLINTON, PUT CARBURETOR AND MANIFOLD BACK ON ENGINE.

31. PUT ON CONTROLS AND CHECK THAT THEY WORK.

CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

1. TORQUED DOWN HEAD BOLTS.
2. PUT ON CARBURETOR AND MANIFOLD, IF NEEDED.
3. PUT ON AND CHECKED CONTROLS.

"TURN THE PAGE"

JOB STEPS

READ: LOOK:

32. CHECK OIL AND FUEL. BE SURE THEY ARE FULL.

33. START THE ENGINE.

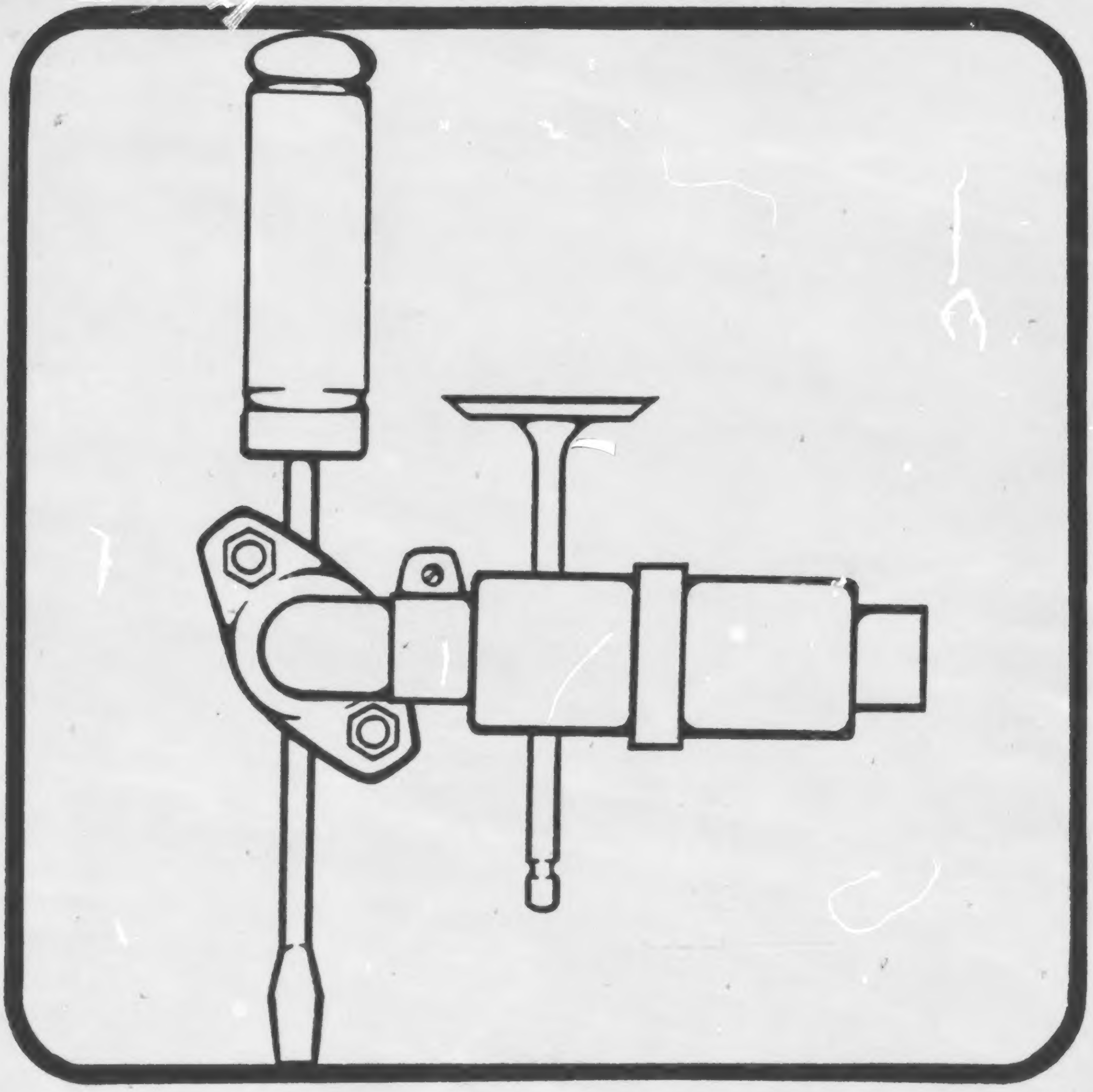
34. ADJUST THE SPEED.

35. CHECK FOR "BLOW-BY". LOOK FOR SMOKE FROM THE VALVE BREATHER.

CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

1. STARTED THE ENGINE, AFTER CHECKING OIL AND FUEL.
2. ADJUSTED SPEED.
3. CHECKED FOR "BLOW-BY".

GOOD WORK! YOU'VE JUST DONE A HARD JOB. NOW CLEAN UP YOUR WORK AREA.



small engine repair

unit: OVERHAUL

capital area career center

module: 7501 25 001 1
7501 25 001 3 **date:** AUGUST 1977 **level:** IV

skill title: HOW TO OVERHAUL AN AIR-COOLED ENGINE

developed & written by: HARRY WRIGHT

visuals by: DAVE WEHRWEIN

WORD GUIDE

OVERHAUL - REBUILD

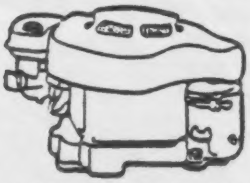
ESTIMATE - GIVE CLOSE GUESS

PERFORMANCE OBJECTIVE

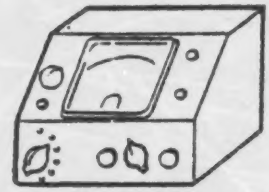
YOU ARE GOING TO LEARN:

1. HOW TO OVERHAUL AN AIR-COOLED ENGINE
2. HOW TO ESTIMATE THE COST OF A JOB FOR A CUSTOMER

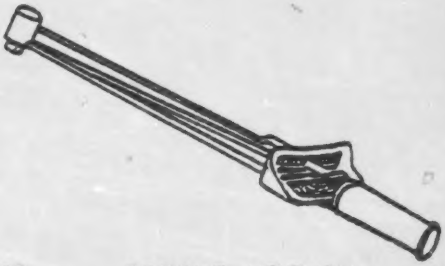
AND IN ORDER TO DO THIS YOU WILL NEED:



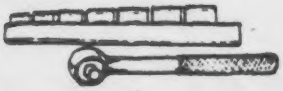
AN AIR-COOLED ENGINE



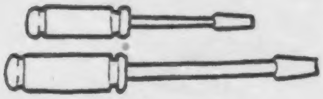
A MERCOTRONIC TESTER



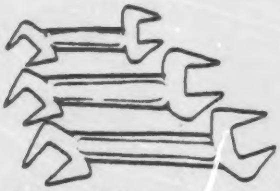
TORQUE WRENCH



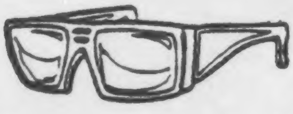
SOCKET SET



SCREWDRIVER SET

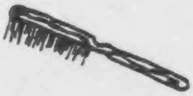


AN OPEN-END WRENCH SET

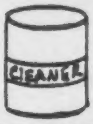


SAFETY GLASSES

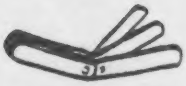
STEAM CLEANER



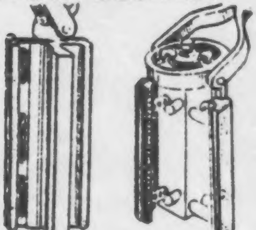
WIRE BRUSH



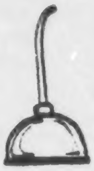
CARBURETOR CLEANER



FEELER GAUGE



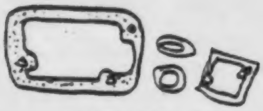
JN OR AN HONE SET



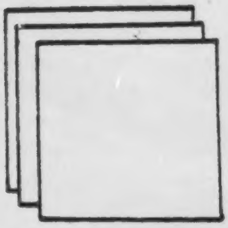
LUBRICATION FLUID

"TURN THE PAGE"

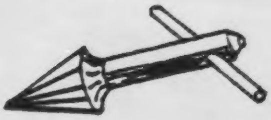
YOU WILL NEED . . .



GASKET SET



LINTLESS PAPER



VALVE GRINDER

WE WILL KNOW YOU CAN DO THIS WHEN:

1. YOU HAVE ALL YOUR EQUIPMENT.
2. YOU HAVE ESTIMATED THE COST FOR A CUSTOMER.
3. YOU HAVE ALL THE NEEDED PARTS FROM THE PARTS DEPARTMENT.
4. THE ENGINE STARTS WITHIN FIVE PULLS, IDLES AT THE PROPER SPEED, AND RUNS SMOOTHLY AT FULL POWER.

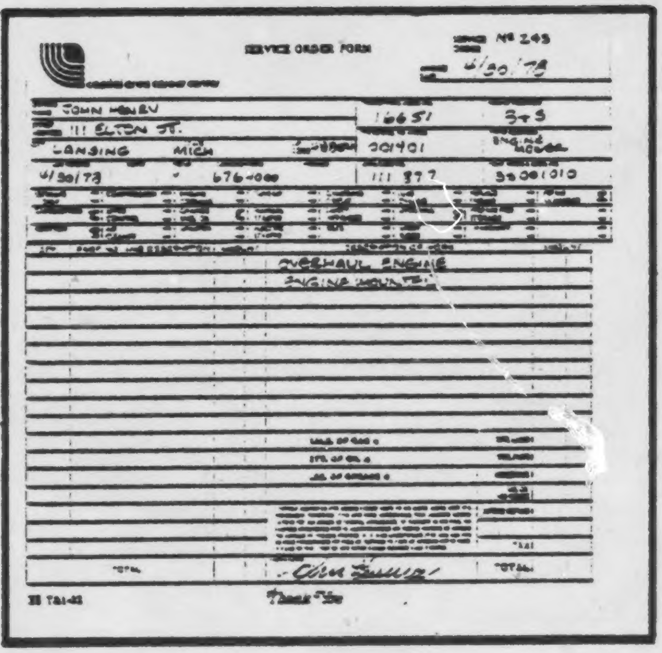
JOB STEPS

READ: **LOOK:**

1. TAKE ALL YOUR EQUIPMENT TO YOUR WORK AREA.

2. IF THE ENGINE IS A CUSTOMER'S (THAT IS, SOMEBODY FROM OUTSIDE THE CENTER), BE SURE YOU HAVE A WORK ORDER FILLED OUT. THE MODEL TYPE AND SERIAL NUMBER OF THE ENGINE MUST BE CORRECT.

3. HAVE THE OWNER SIGN THE WORK ORDER.



SERVICE ORDER FORM

№ 243

4/30/78

JOHN HENRY

111 ELTON ST.

LANSING MICH

4/30/78 676-4000

16651 3+5

301401 ENGINE MOWER

111 377 35001010

OVERHAUL ENGINE

ENGINE MOUNTS

TOTAL

TOTAL

CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

1. ALL YOUR EQUIPMENT.
2. THE ORDER FORM FILLED IN CORRECTLY.
3. THE CUSTOMER'S SIGNATURE ON THE FORM.

"TURN THE PAGE"

WORD GUIDE

MOUNTED - ATTACHED

JOB STEPS

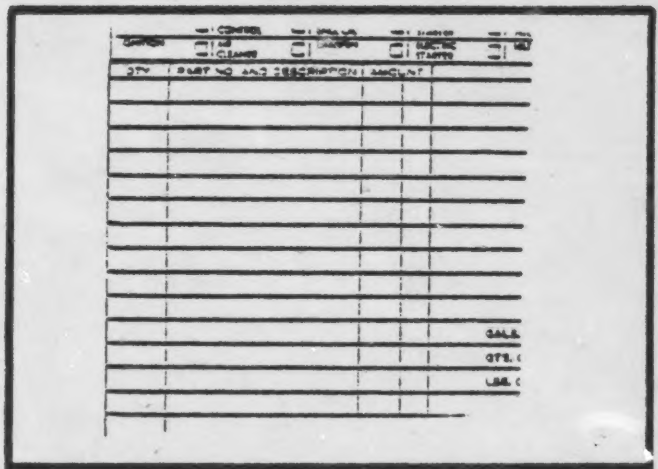
READ:

LOOK:

4. NOW THAT THE ORDER IS FILLED OUT, TAKE OUT THE THIRD SHEET OR THE HARD COPY (CARDBOARD TYPE PAPER).

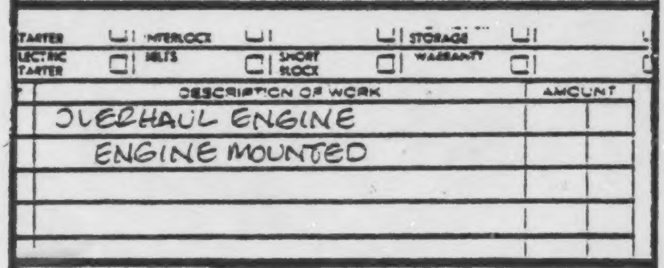
5. THEN TAKE THE TWO TOP SHEETS OF THE WORK ORDER TO THE PARTS DEPARTMENT.

NOTE: YOU WILL WORK FROM THE HARD COPY. LIST ALL PARTS THAT YOU NEED IN THE "MATERIAL USED" AREA. BE SURE TO ADD THE PARTS TO THE "MATERIAL USED" AREA AS YOU ARE WORKING ON THE ENGINE SO YOU WON'T FORGET PARTS YOU HAVE ADDED.



CONTROL
AIR CLEANER
ELECTRIC STARTER
QTY
PART NO. AND DESCRIPTION
AMOUNT
GALS.
QTS.
LBS.

6. IF THE ENGINE IS MOUNTED, BE SURE TO MAKE A NOTE ON THE HARD COPY SO THAT THE CUSTOMER WILL BE CHARGED FOR THE EXTRA TIME.

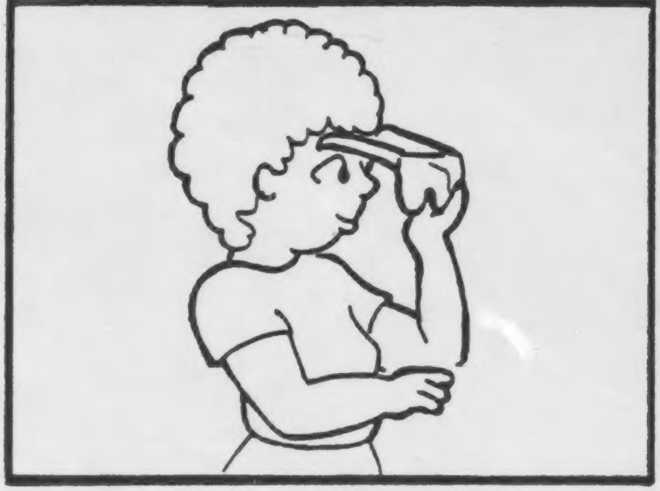


STARTER
INTERLOCK
STORAGE
ELECTRIC STARTER
BELTS
SHORT BLOCK
WARRANTY
DESCRIPTION OF WORK
AMOUNT

OVERHAUL ENGINE

ENGINE MOUNTED

7. PUT ON YOUR SAFETY GLASSES.



"TURN THE PAGE"

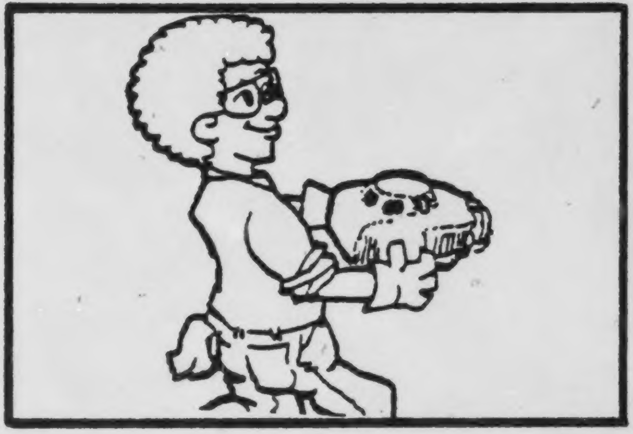
WORD GUIDE

CONDITION - SHAPE OF

JOB STEPS

READ: LOOK:

8. IF THE ENGINE IS MOUNTED, USE YOUR SOCKET SET OR WRENCHES TO REMOVE IT FROM ITS MOUNT (IF YOU DO NOT KNOW HOW TO DO THIS, LOOK IN UNIT 15).



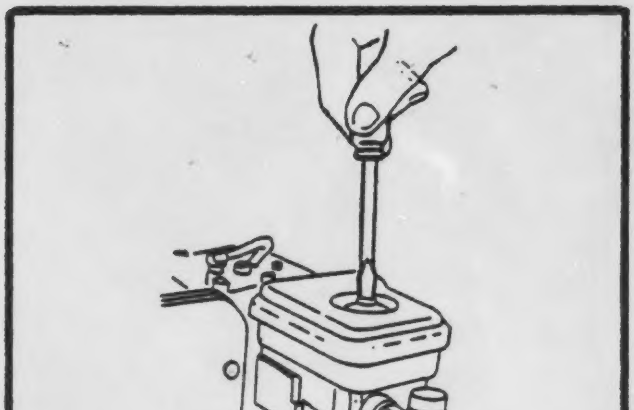
9. IF THE ENGINE IS VERY DIRTY, USE YOUR POWER WASHER OR STEAM CLEANER TO CLEAN IT OFF. THIS WILL KEEP THE INSIDE ENGINE PARTS CLEAN.

10. REMOVE THE AIR FILTER.

ASK YOURSELF THE FOLLOWING QUESTIONS AS YOU CHECK IT:

1. DOES IT HAVE ENOUGH OIL?
2. IS IT CLEAN?

NOTE: IF THE AIR FILTER OIL BATH IS FULL OF DIRT, THE ENGINE MAY BE DAMAGED. CHECKING THE FILTER CAN TELL YOU ABOUT THE CONDITION OF THE ENGINE.



"TURN THE PAGE"

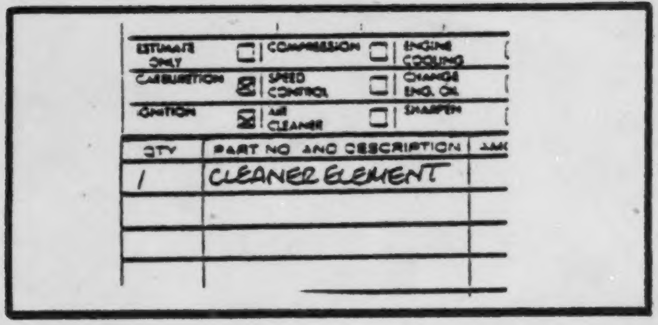
WORD GUIDE

GOVERNOR - CONTROLS SPEED BY ITSELF

JOB STEPS

READ: LOOK:

11. IF NEEDED, PUT AN AIR FILTER ELEMENT ON THE LIST.



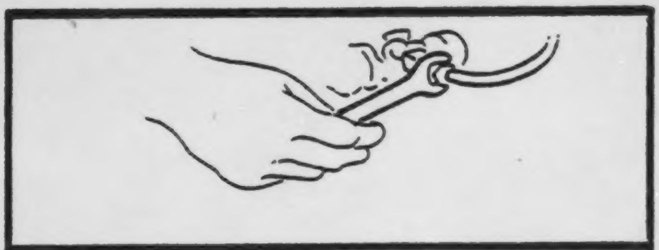
ESTIMATE ONLY	☐	COMPRESSION	☐	ENGINE COOLING	
CARBURETION	☒	SPEED CONTROL	☐	CHANGE ENG. OIL	
IGNITION	☒	AIR CLEANER	☐	SHARPEN	

QTY	PART NO AND DESCRIPTION	AM
1	CLEANER ELEMENT	

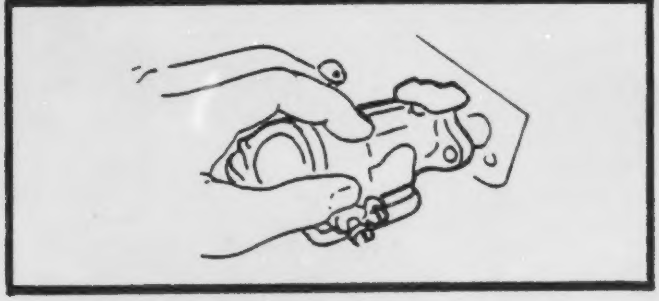
CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

1. TAKEN THE CORRECT WORK ORDER SHEETS TO THE PARTS DEPARTMENT.
2. PUT ON SAFETY GLASSES.
3. REMOVED THE ENGINE FROM ITS MOUNT.
4. CLEANED IT CORRECTLY.
5. REMOVED THE AIR FILTER AND CHECKED IT CORRECTLY.
6. PUT ON AIR FILTER ELEMENT.

12. USING YOUR OPEN-ENDED WRENCH (IF NEEDED), TAKE OFF THE FUEL LINE FROM THE CARBURETOR.



13. WITH YOUR SOCKET SET OR OPEN-ENDED WRENCH, REMOVE THE CARBURETOR.



NOTE: USING MOD FROM UNIT 5 AS A GUIDE, MAKE A NOTE OF HOW THE GOVERNOR IS HOOKED UP.

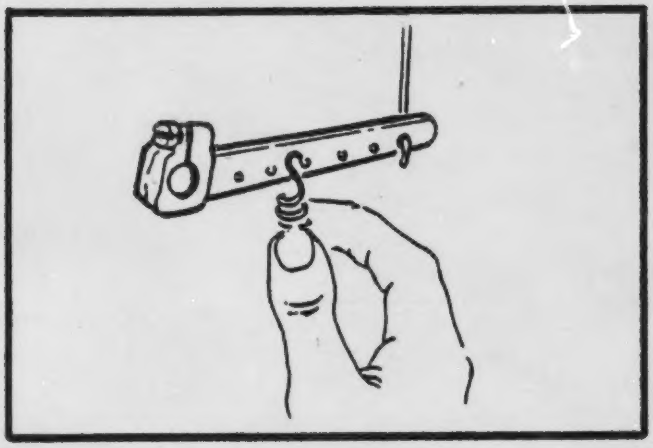
"TURN THE PAGE"

JOB STEPS

READ:

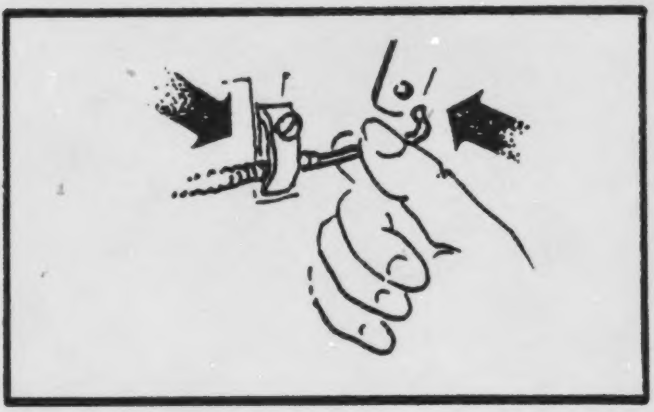
LOOK:

14. CHECK THE GOVERNOR LINKAGE FOR WEAR (LARGE HOLES IN THE CARB THROTTLE). LOOK AT THE BENDS OF THE LINKAGE. IF THE LINKAGE IS WORN, AND IT HAS TO BE REPLACED, LIST THE PARTS YOU WILL NEED ON THE HARD COPY.



15. CHECK THE HOLES IN THE THROTTLE PLATE WHERE THE GOVERNOR LINK GOES.

16. CHECK THE THROTTLE SHAFT FOR LOOSENESS.



"TURN THE PAGE"

WORD GUIDE

NEOPRENE - FUEL RESISTANT RUBBER

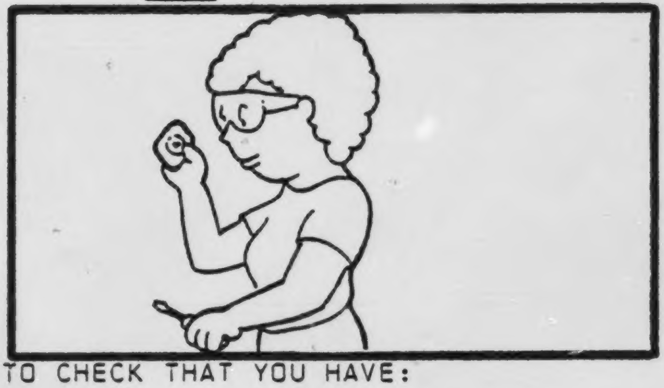
AIR HOUSING - COVER ON TOP OF ENGINE TO LET IN AIR

JOB STEPS

READ: LOOK:

17. TAKE APART THE CARBURETOR AND WHILE YOU ARE DOING IT, REMOVE ANY RUBBER OR NEOPRENE.

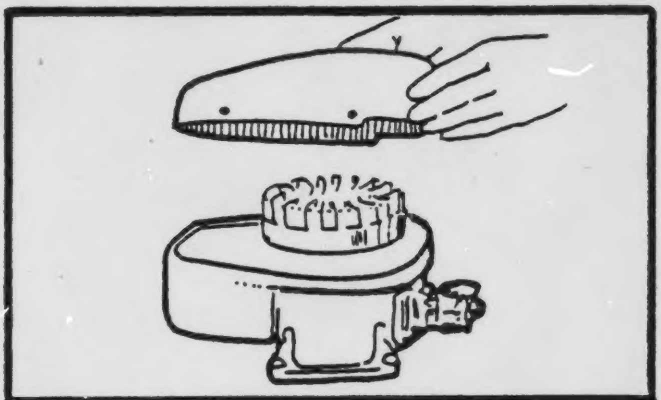
NOTE: IF YOU WANT TO INSTALL A CARBURETOR REBUILD KIT, PUT IT ON THE LIST NOW. IF YOU NEED TO DO THIS JOB, USE A MOD FROM UNIT 5.



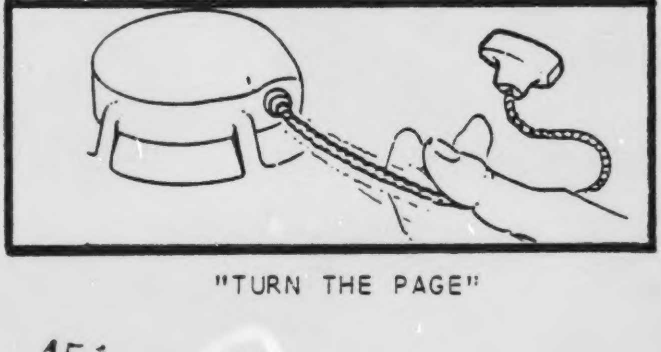
CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

1. DISCONNECTED THE FUEL LINE.
2. REMOVED THE CARBURETOR.
3. CHECKED THE GOVERNOR LINKAGE FOR WEAR.
4. CHECKED THE HOLES IN THE THROTTLE PLATE.
5. CHECKED THE THROTTLE SHAFT FOR LOOSENESS.
6. TAKEN APART THE CARBURETOR CORRECTLY.

18. REMOVE THE AIR HOUSING.



19. IF THE ENGINE USES A REWIND STARTER IN THE HOUSING, PULL THE ROPE ALL THE WAY OUT.



"TURN THE PAGE"

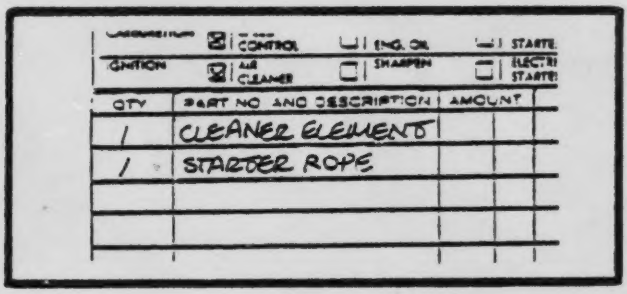
JOB STEPS

READ: LOOK:

20. CHECK THE ROPE TO SEE

A. IF IT IS FRAYED
B. IF THE ROPE GOES ALL THE WAY BACK INTO THE HOUSING (FOLLOW THE STEPS IN MOD 7501 03 004 1/7501 03 004 3).

21. IF THE STARTER NEEDS PARTS, PUT THEM ON THE LIST ALSO (USE A MOD FROM UNIT 3).



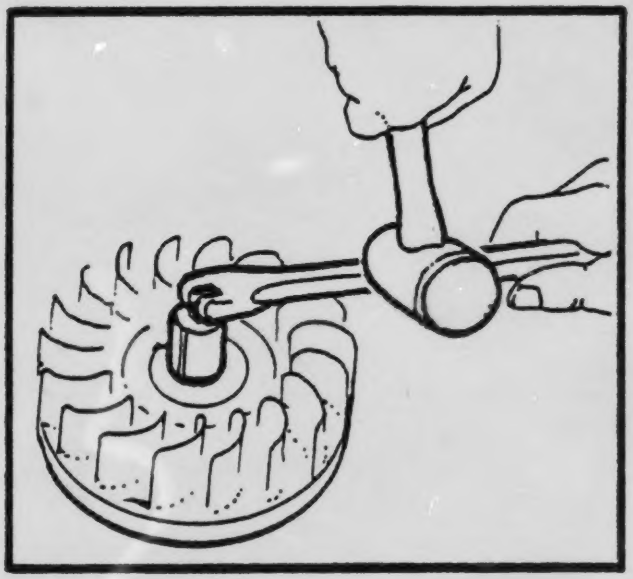
[illegible]	☒ CONTROL	☐ ENG. OIL	☐ STARTE
IGNITION	☒ AIR CLEANER	☐ SHARPEN	☐ ELECTRI STARTE

QTY	PART NO AND DESCRIPTION	AMOUNT		
1	CLEANER ELEMENT			
1	STARTER ROPE			

CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

1. REMOVED THE AIR HOUSING.
2. CHECKED THE STARTER ROPE CORRECTLY.
3. LISTED STARTER PARTS, IF NEEDED.

22. USING YOUR OPEN-ENDED WRENCH OR SOCKET SET, REMOVE THE FLYWHEEL NUT OR STARTER CLUTCH ASSEMBLY.



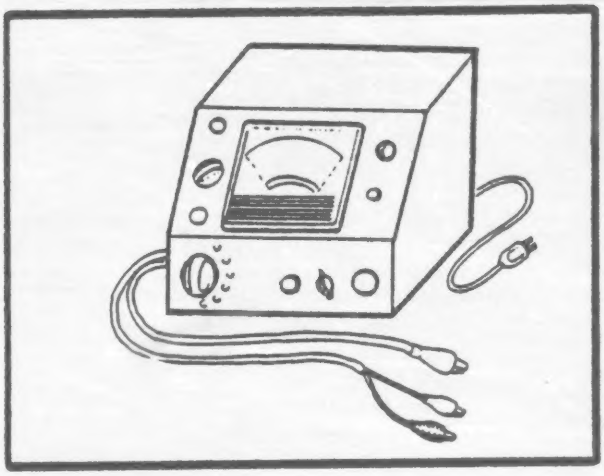
"TURN THE PAGE"

JOB STEPS

READ:	LOOK:

23. TAKE OFF THE FLYWHEEL. IF YOU DON'T REMEMBER HOW TO DO IT, CHECK BACK TO MOD #7501 08 001 1/7501 08 001 3.

24. WITH YOUR MERCOTRONIC TESTER, CHECK THE FOLLOWING PARTS: →



A. COIL
B. CONDENSER
C. POINTS

USE MODS #7501 13 001 1/7501 13 001 3, 7501 13 002 1/7501 13 002 3, AND 7501 13 003 1/7501 13 003 3.

25. LIST THE PARTS YOU WILL PROBABLY NEED.

CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

1. REMOVED THE FLYWHEEL NUT OR STARTER CLUTCH ASSEMBLY.
2. REMOVED THE FLYWHEEL CORRECTLY.
3. CHECKED THE COIL, THE CONDENSER AND THE POINTS.
4. LISTED THE PARTS THAT YOU WILL NEED.

"TURN THE PAGE"

WORD GUIDE

HEAD - THE COVER OVER THE PISTONS AND CRANKSHAFT

BLOWN - REFERS TO THE GASKET AROUND THE HEAD -- MEANS BROKEN OR SEPARATED

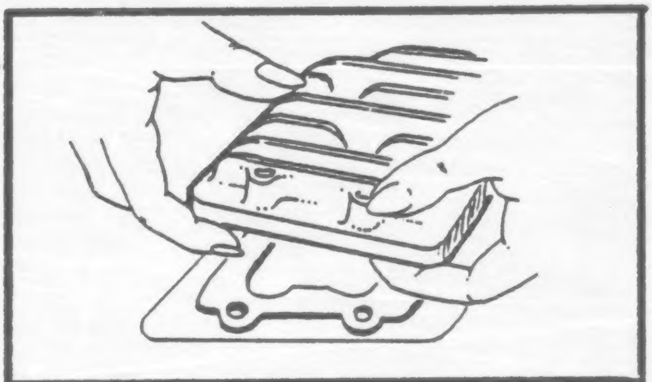
CARBON - SUBSTANCES LEFT OVER FROM BURNING

REBORING - TO MAKE SMOOTH AND EVEN

JOB STEPS

READ: LOOK:

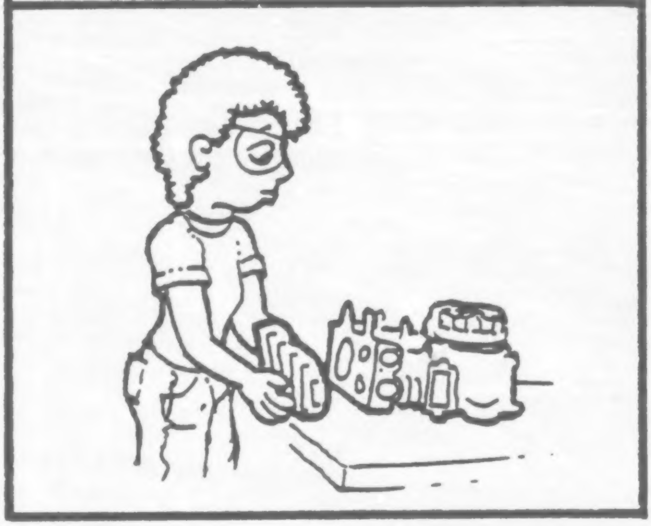
26. WITH YOUR SPEED WRENCH OR IMPACT SOCKET REMOVE THE HEAD OF THE ENGINE.



27. CHECK THE HEAD AND THE TOP OF THE PISTONS. AS YOU DO, ASK YOURSELF THESE QUESTIONS:

    A. IS THE HEAD GASKET BLOWN?
    B. HOW MUCH CARBON IS THERE IN THE HEAD AND ON THE PISTON?
    C. IS THE CARBON HARD OR OILY?

NOTE: IF THERE IS A LOT OF OIL IN THE CARBON, THAT COULD MEAN THAT THE RINGS ARE VERY BAD OR THAT THE CYLINDER WILL NEED TO BE REBORED. IF THE CARBON IS HARD, THEN THE RINGS MAY NEED REPLACING. THE CYLINDER MAY NOT NEED REBORING (SEE MOD #7501 01 003 1/ 7501 01 003 3.)



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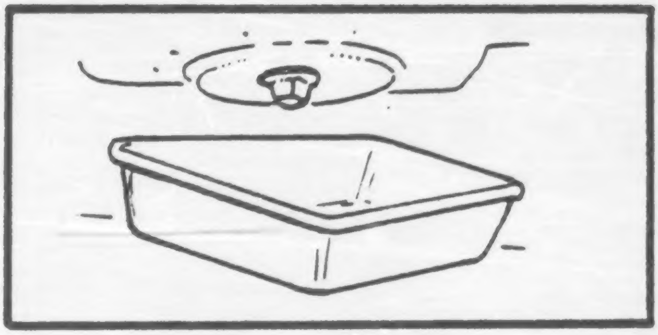
JOB STEPS

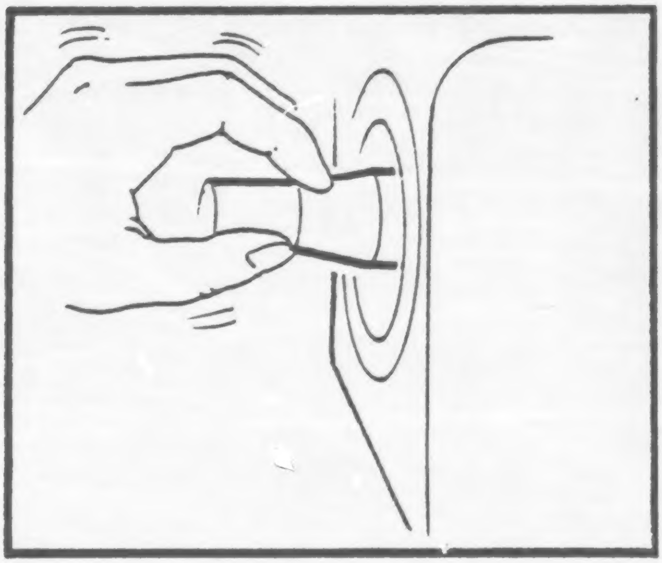
READ: LOOK:

28. WITH YOUR SOCKET OR WRENCH, LOOSEN THE OIL PLUG UNDERNEATH THE CRANKCASE. →



29. DRAIN THE OIL.

30. AFTER THE OIL IS DRAINED, HOLD THE CRANKSHAFT AND TRY TO WIGGLE IT. IF IT MOVES MORE THAN USUAL, REPLACE THE SUMP OR PUT IN NEW MAIN BEARINGS SEE MOD #7501 01 001 1/ 7501 01 001 3). →



CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

1. REMOVED THE HEAD.
2. CHECKED THE HEAD AND PISTONS FOR CARBON OR OIL.
3. LOOSENED THE OIL PLUG.
4. DRAINED THE OIL.
5. CHECKED THE CRANKSHAFT TO SEE IF IT'S ALL RIGHT.

"TURN THE PAGE"

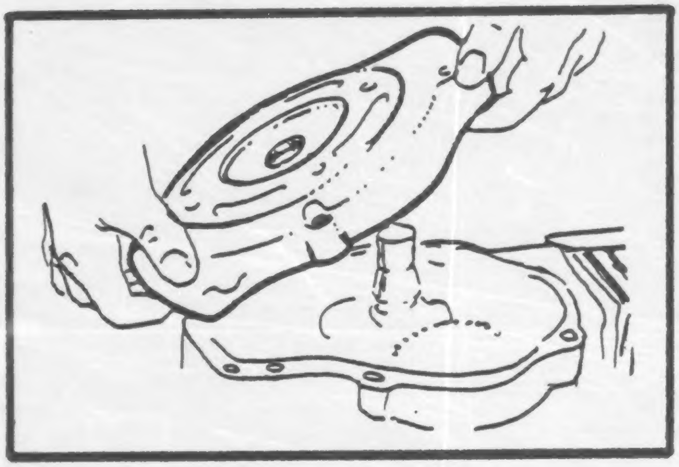
WORD GUIDE

OIL DIPPER - BRINGS UP OIL INTO THE CYLINDER

JOB STEPS

READ: LOOK:

31. REMOVE THE SUMP OR THE SIDE COVER (IF THIS ENGINE IS A VERTICAL SHAFT WITH A POWER TAKE-OFF OUT THE SIDE, BE SURE TO LOOK AT MOD #7501 01 00. 1/7501 01 002 3 AGAIN BECAUSE THERE IS A HIDDEN BOLT).



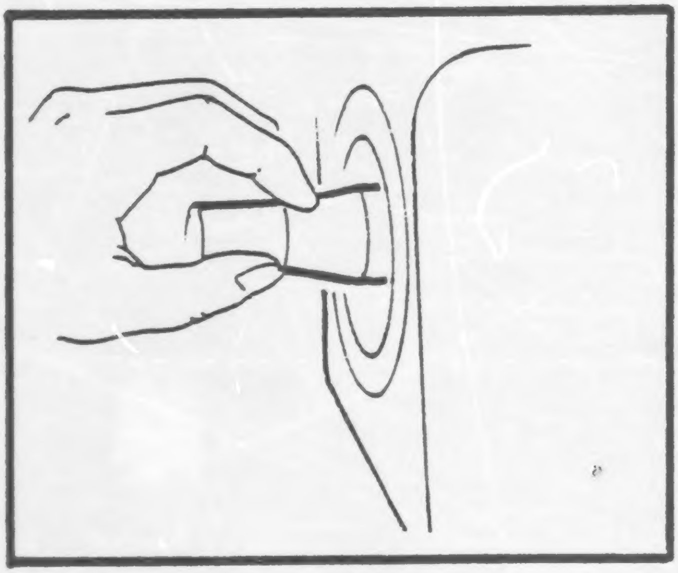
NOTE: ADD OIL SEALS TO YOUR LIST. ALSO, SINCE YOU HAVE ALREADY REMOVED A FEW GASKETS, ADD A NEW GASKET SET TO YOUR LIST. NEVER USE AN OLD GASKET BECAUSE IT CANNOT BE COMPRESSED PROPERLY AND MAY LEAK.

32. LOOK AT HOW THE ROD IS CONNECTED ON THE CRANKSHAFT. ASK YOURSELF THESE QUESTIONS:

A. IS THERE AN OIL DIPPER ON THE ROD?
B. HOW IS IT PUT ON?

MAKE A NOTE ON THE HARD COPY SO YOU DON'T FORGET (SEE MOD 7501 01 009 1/7501 01 009 3).

33. WITH YOUR HAND, TURN THE CRANKSHAFT UNTIL THE PISTON IS IN THE MIDDLE OF ITS STROKE (ITS UP AND DOWN MOTION). THIS PUTS THE PISTON ABOUT 1 INCH OR SO FROM THE TOP OF THE CYLINDER.

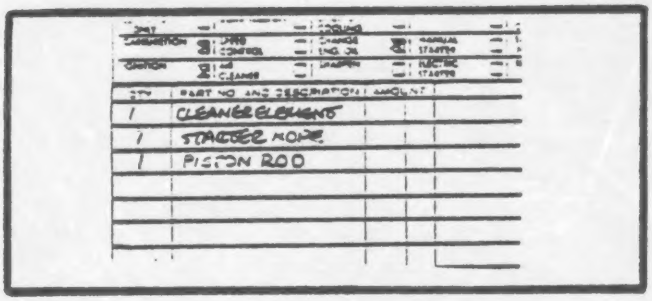


"TURN THE PAGE"

JOB STEPS

READ: **LOOK:**

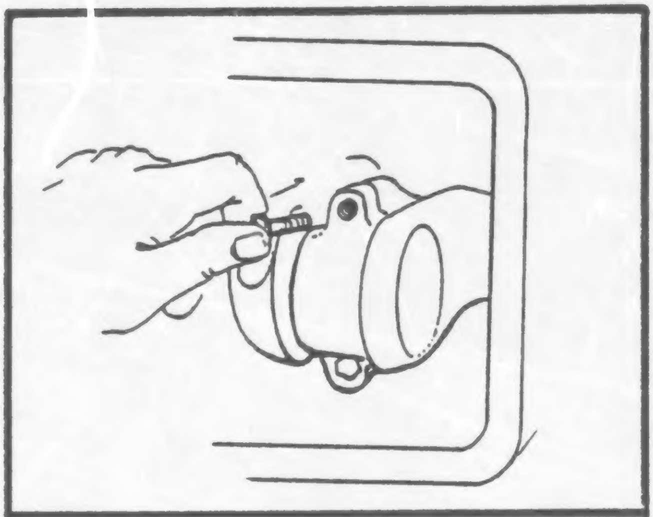
34. TWIST THE CRANKSHAFT BACK AND FORTH A LITTLE AND NOTICE IF THERE IS ANY LOOSENESS BETWEEN THE ROD AND THE CRANKSHAFT. IF THERE IS, YOU WILL HAVE TO MIKE THE CRANKSHAFT AND YOU WILL NEED A NEW ROD.



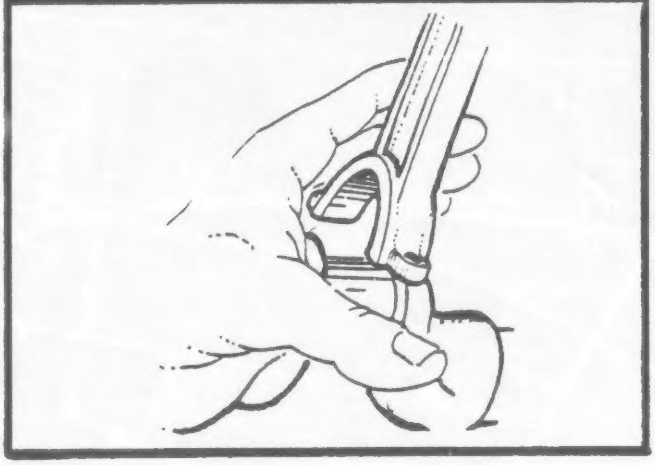
QTY	PART NO AND DESCRIPTION	AMOUNT		
1	CLEANER ELEMENT			
1	STARTER ROPE			
1	PISTON ROD			

35. ADD A NEW ROD TO THE LIST. FOR THE ROD PART OF THE JOB, USE MOD 7501 01 009 1/ 7501 01 009 3.

36. WITH YOUR SOCKET AND RATCHET LOOSEN THE ROD BOLTS AND REMOVE THE ROD CAP AND DIPPER (IF THERE IS ONE).



37. VERY CAREFULLY PUSH THE ROD AND PISTON TO THE TOP OF THE CYLINDER.

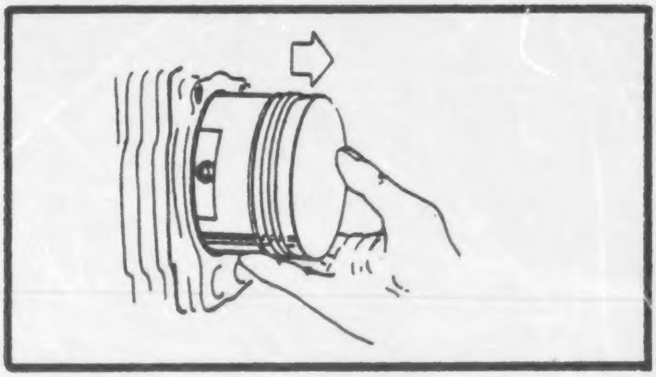


"TURN THE PAGE"

JOB STEPS

READ: LOOK:

38. AGAIN, VERY CAREFULLY PUSH THE PISTON AND ROD OUT OF THE CYLINDER. BE READY TO CATCH THE PISTON AS IT COMES OUT.



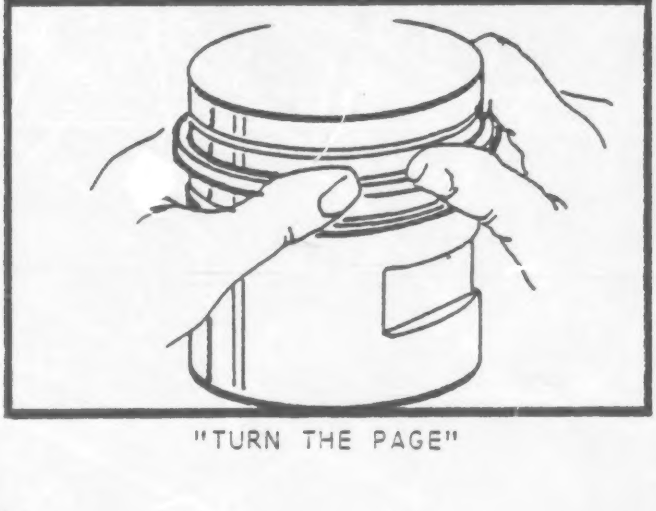
CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

1. REMOVED THE SUMP OR THE SIDE COVER.
2. TAKEN OUT THE HIDDEN BOLT (IF THERE IS ONE).
3. CHECKED THE CRANKSHAFT FOR LOOSENESS BETWEEN THE ROD AND THE CRANKSHAFT.
4. REMOVED THE ROD CAP AND DIPPER (IF THERE IS ONE).
5. PUSHED THE PISTON AND ROD OUT OF THE CYLINDER.

39. GET THE CORRECT MANUAL FOR THE ENGINE ON WHICH YOU ARE WORKING.

40. REMOVE THE RINGS FROM THE PISTON. CHECK THE PISTON SKIRT CLEARANCE.

NOTE: REMEMBER TO CHECK IT OPPOSITE THE WRIST PIN BOSSES. IF THE CLEARANCE IS ALL RIGHT, GO TO STEP 41. IF NOT, IT WILL HAVE TO BE REBORED. IF IT HAS TO BE REBORED, USE MOD 7501 16 004 1/ 7501 16 004 3 AND 7501 16 003 1/ 7501 16 003 3.



"TURN THE PAGE"

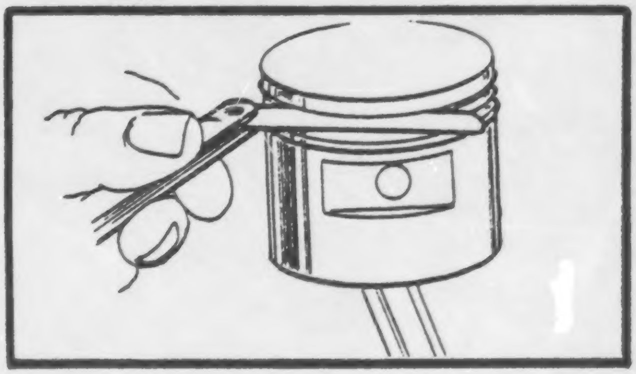
WORD GUIDE

SPEC'S - SPECIFICATIONS; GUIDELINES

JOB STEPS

READ: LOOK:

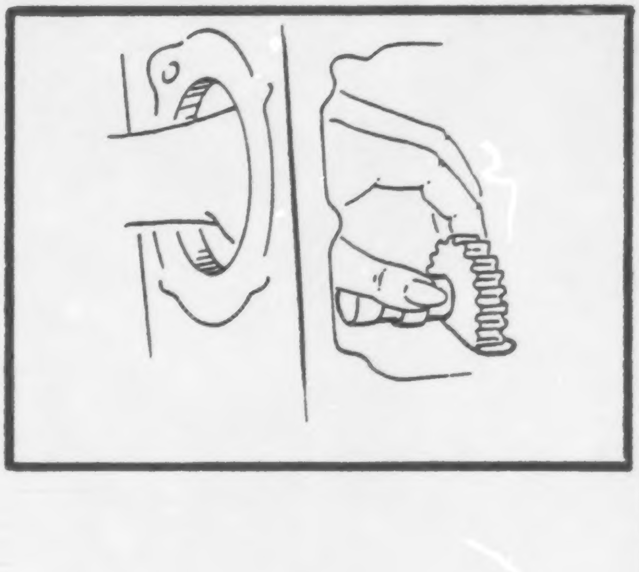
41. IF YOU ARE GOING TO USE THE OLD PISTON, WITH FEELER GAUGE CHECK PISTON RING LAND CLEARANCE. IF IT FAILS THIS TEST, PUT A NEW PISTON ON THE LIST OF PARTS YOU WILL NEED. FOLLOW MODS IN UNIT 23.



CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

1. THE CORRECT ENGINE MANUAL.
2. REMOVED THE RINGS FROM THE PISTON.
3. CHECKED THE PISTON SKIRT CLEARANCE.
4. CHECKED THE PISTON RING LAND CLEARANCE.
5. ADDED A NEW PISTON ON THE LIST OF PARTS IF YOU NEED ONE.

42. REMOVE THE CAMSHAFT AND TAPPETS.



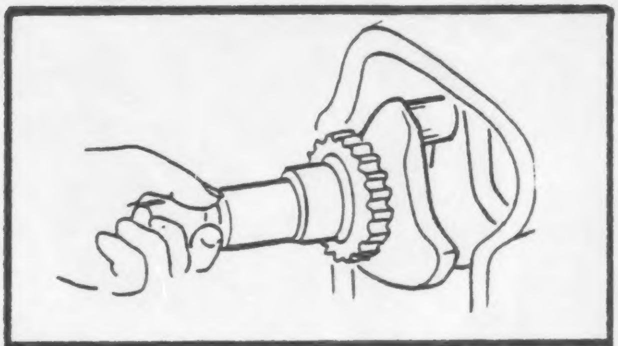
43. CHECK FOR CRACKS AND/OR BROKEN TEETH AND MIKE THE LOBES ON THE CAMSHAFT (CHECK THE MANUAL TO SEE IF THERE ARE SPEC'S ON IT.

"TURN THE PAGE"

JOB STEPS

READ: LOOK:

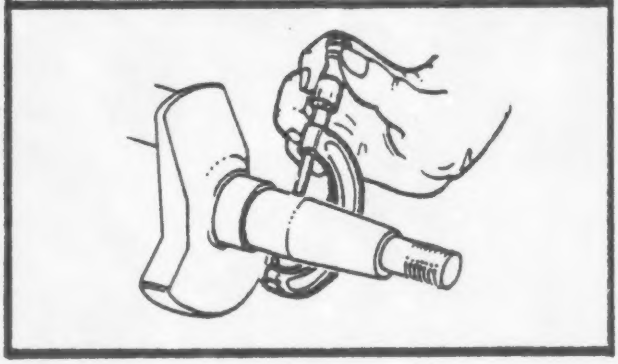
44. PULL THE CRANKSHAFT OUT OF THE BEARING.



45. MIKE THE CRANKSHAFT.

CHECK THE CHART FOR REJECT SIZES. SEE MOD 7501 01 021 1/7501 01 021 3 FOR INFORMATION ON HOW TO PROPERLY MIKE A CRANKSHAFT.

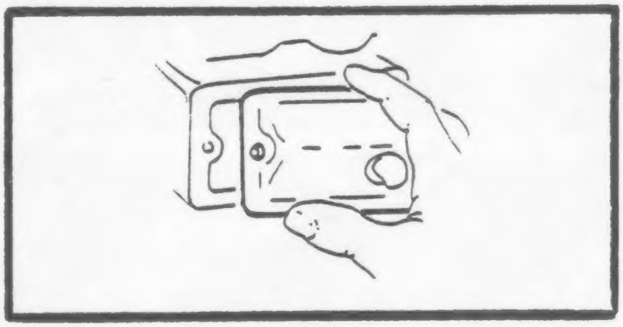
MAKE SURE YOU HAVE YOUR SAFETY GLASSES ON.



CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

1. REMOVED THE CAMSHAFT AND TAKEN OFF THE TAPPETS.
2. CHECKED FOR CRACKS AND/OR BROKEN TEETH.
3. MIKED THE LOBES ON THE CAMSHAFT.
4. REMOVED AND MIKED THE CRANKSHAFT.

46. TAKE YOUR SCREWDRIVER OR SOCKET TOOL, TAKE OFF THE VALVE CHAMBER BREATHER ASSEMBLY OR COVER. USE MOD # 7501 24 001 1/ 7501 24 001 3.

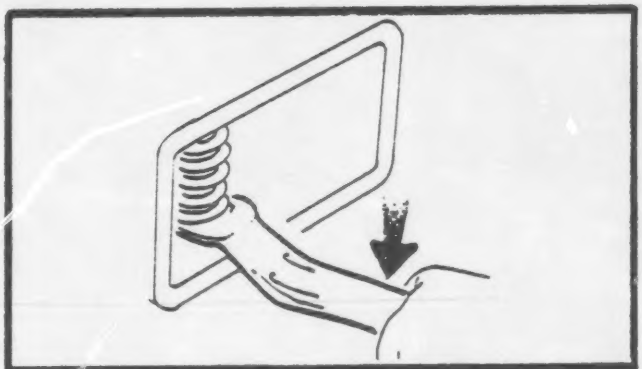


"TURN THE PAGE"

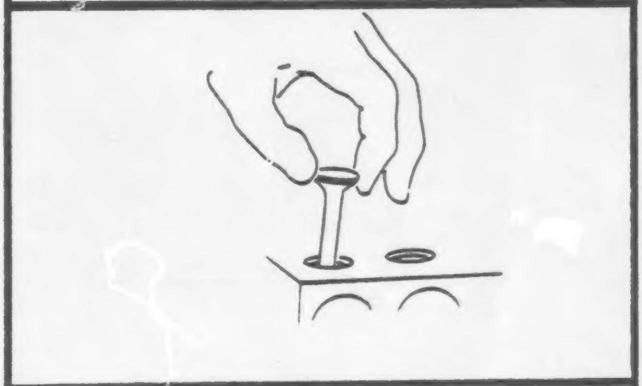
JOB STEPS

READ: LOOK:

47. REMOVE THE VALVE SPRINGS AND RETAINERS. USE #7501 24 002 1/ 7501 24 002 3.



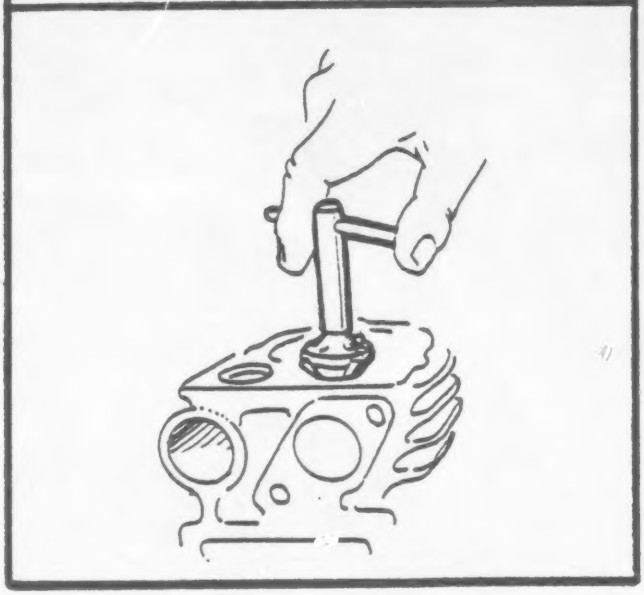
48. REMOVE THE VALVES.



49. WITH YOUR WIRE BRUSH, CLEAN THE VALVES.

50. WITH A VALVE GRINDER, GRIND THE VALVES AND SEATS AT THE PROPER ANGLE.

NOTE: IF THE SEAT IS TOO WIDE OR TOO HIGH ON THE VALVE FACE, BE SURE TO RELIEVE THE SEAT. YOU SHOULD KNOW HOW FROM MOD # 7501 24 010 1/7501 24 010 3.



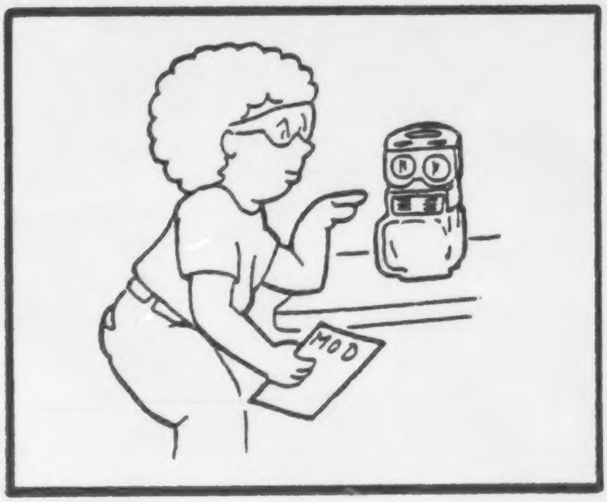
"TURN THE PAGE"

JOB STEPS

READ: LOOK:

51. IF THE VALVES NEED REPLACING PUT THEM ON THE PARTS LIST.

52. NOW CHECK THE VALVE GUIDES. IF THEY NEED REPLACING, ADD THEM TO YOUR LIST (USE MOD #7501 24 006 1/ 7501 24 006 3 OR #7501 24 007 1/ 7501 24 007 3). →



CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

1. REMOVED THE VALVE CHAMBER BREATHER ASSEMBLY OR COVER.
2. REMOVED THE VALVE SPRINGS AND RETAINER.
3. REMOVED AND CLEANED THE VALVES.
4. GROUND THE VALVES AND SEATS AT THE PROPER ANGLE.
5. CHECKED THE VALVE GUIDES TO SEE IF THEY NEED REPLACING.
6. HAVE ADDED ALL THE PARTS YOU NEED TO YOUR PARTS LIST.

53. CHECK TO SEE IF THE MUFFLER IS ALL RIGHT.

"TURN THE PAGE"

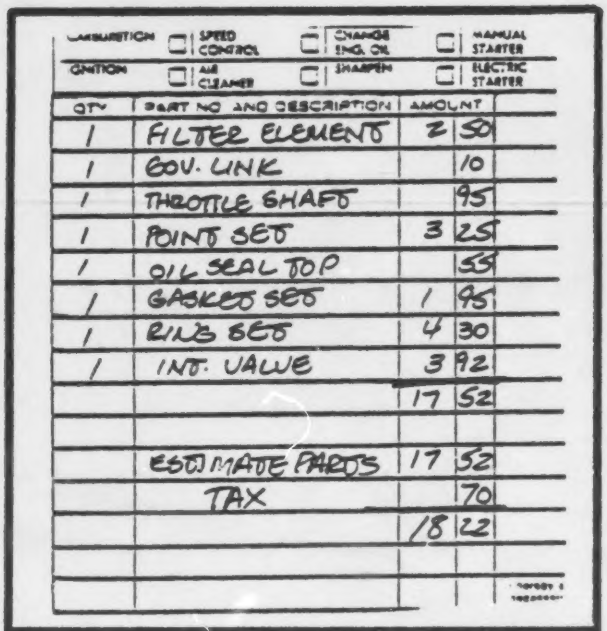
JOB STEPS

READ: **LOOK:**

54. LOOK TO SEE IF THE WRISTPIN IS IN GOOD CONDITION. IF NOT, USE MOD #7501 01 009 1/7501 01 009 3.

55. IF YOU HAVE ALL THE PARTS LISTED, TAKE THE LIST TO THE PARTS DEPARTMENT AND HAVE THEM LOOK UP THE PRICE OF THE PARTS SO YOU CAN CALL THE CUSTOMER WITH AN ESTIMATE (SEE EXAMPLE ON THE RIGHT).

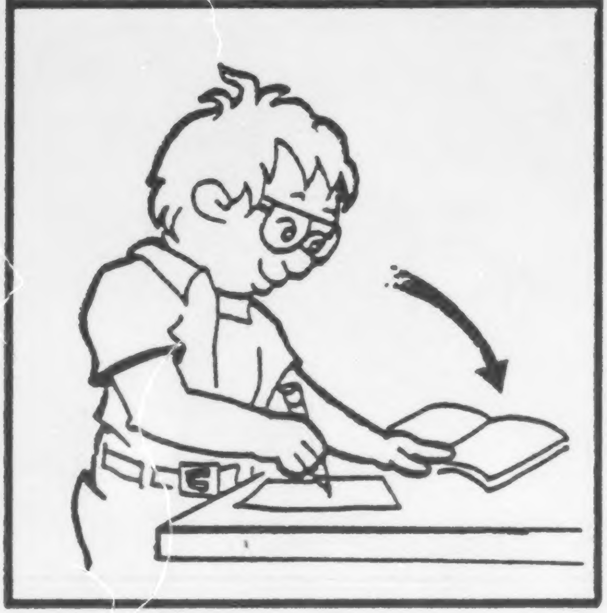
56. WHEN YOU GET THE LIST BACK WITH PARTS AND PRICES, TOTAL THEM AND ADD THE TAX.



CARBURETION ☐ SPEED CONTROL ☐ CHANGE ENG. OIL ☐ MANUAL STARTER
IGNITION ☐ AIR CLEANER ☐ SHARPEN ☐ ELECTRIC STARTER

QTY	PART NO AND DESCRIPTION	AMOUNT	
1	FILTER ELEMENT	2	50
1	GOV. LINK		10
1	THROTTLE SHAFT		95
1	POINT SET	3	25
1	OIL SEAL TOP		55
1	GASKET SET	1	95
1	RING SET	4	30
1	INT. VALVE	3	92
		17	52
	ESTIMATE PARTS	17	52
	TAX		70
		18	22

57. THEN, ESTIMATE AND TOTAL THE LABOR, USING A FLAT RATE CHART OR MANUAL.



"TURN THE PAGE"

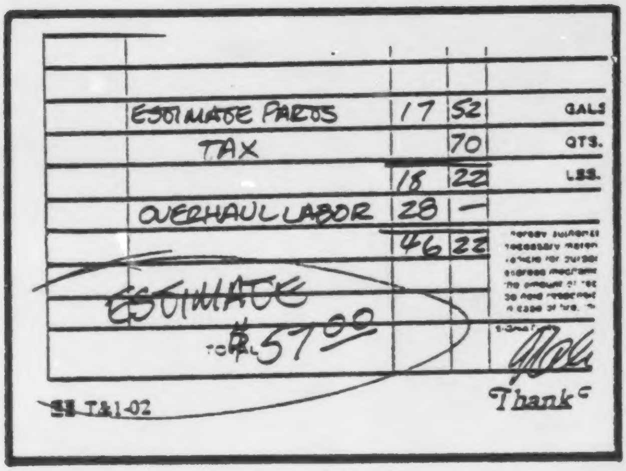
JOB STEPS

READ:

LOOK:

58. WHEN YOU HAVE THE TOTAL, ROUND IT OFF TO THE NEXT HIGHEST DOLLAR. THEN ADD $10 TO THE TOTAL.

NOTE: ADD TEN DOLLARS BECAUSE:
  1. YOU PROTECT YOURSELF IN CASE YOU MISSED SOMETHING.
  2. WHEN THE CUSTOMER COMES TO PICK UP THE MACHINE AND THE BILL IS LOWER THAN THE HIGHEST PRICE QUOTED, THE CUSTOMER IS HAPPY. SO ALWAYS, ESTIMATE A LITTLE HIGH.



ESTIMATE PARTS	17	52	GALS
TAX		70	QTS.
	18	22	LBS.
OVERHAUL LABOR	28	—	
	46	22	

ESTIMATE

TOTAL \$57^{00}

TA1-02

Thank

59. CALL THE CUSTOMER AND GIVE HIM/HER THE ESTIMATE PRICE.

60. WHEN YOU GET PERMISSION TO REPAIR THE ENGINE, WRITE DOWN THE ORDER;

  1. TO WHOM YOU TALKED.
  2. THE TIME.
  3. THE DATE.

"TURN THE PAGE"

JOB STEPS

READ: LOOK:

61. GIVE THE ORDER TO THE PARTS DEPARTMENT AND HAVE THEM PULL THE NEW PARTS FOR YOU.

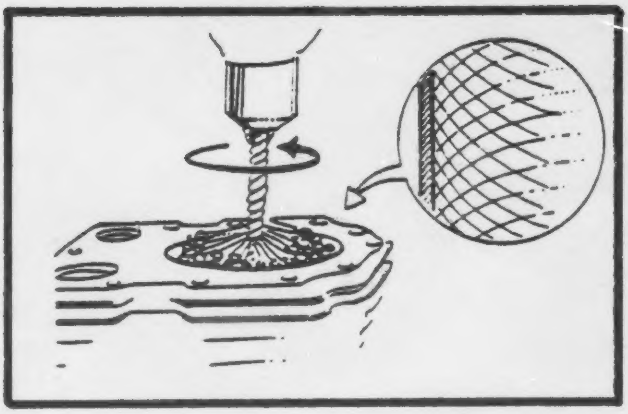
CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

1. CALLED CUSTOMER TO GIVE ESTIMATE.
2. PERMISSION TO GO AHEAD AND REPAIR THE ENGINE.
3. ALL THE CORRECT PARTS.

NOTE: MAKE SURE YOU STILL HAVE ON YOUR SAFETY GLASSES.

62. BEFORE YOU PUT THE ENGINE TOGETHER AGAIN, AND USING THE PROPER CLEANING FLUID, CLEAN, DRY AND LAY OUT THE PARTS IN ORDER SO YOU DON'T FORGET TO INSTALL A PART.
REMEMBER: CLEAN CARB PARTS IN CLEANER AFTER YOU HAVE PERMISSION.

63. REBORE OR DEGLAZE THE CYLINDER (USE MOD #7501 23 003 1/7501 23 003 3).

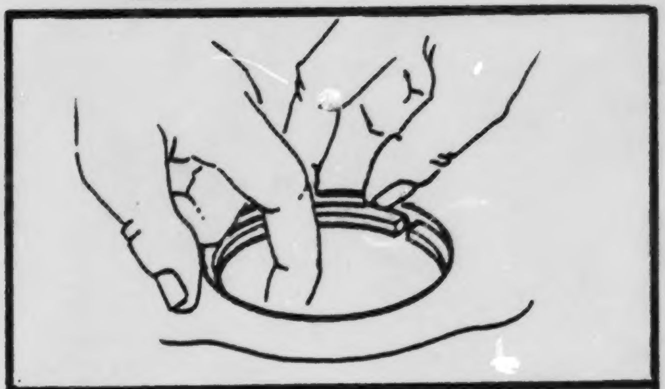


"TURN THE PAGE"

JOB STEPS

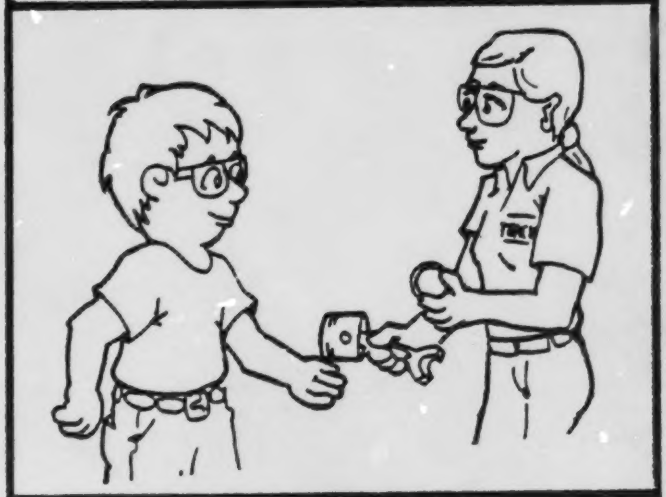
READ: LOOK:

64. PUT THE RINGS BACK IN THE CYLINDER AND CHECK THE END GAP OF THE RINGS. USE A FEELER GAUGE.

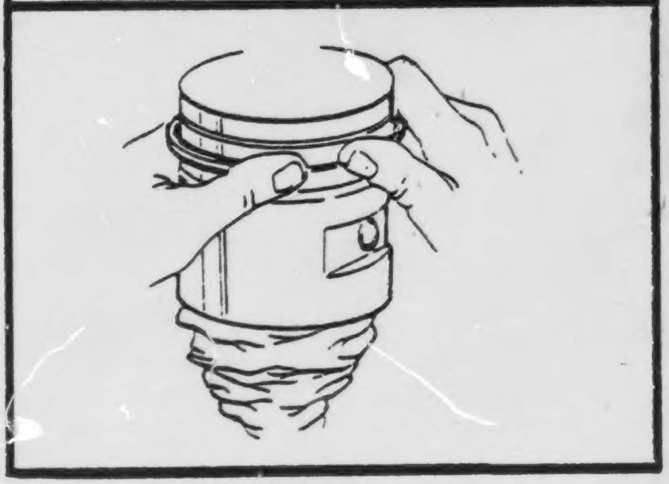


65. BE SURE THE WRIST PIN LOCKS ARE IN AND TIGHT (USE MOD # 7501 23 003 1/7501 23 003 3).

NOTE: BEFORE INSTALLING ANYTHING, CHECK WITH YOUR INSTRUCTOR.



66. CORRECTLY INSTALL THE NEW RINGS ON THE PISTON (USE MOD # 7501 23 001 1/7501 23 001 3).



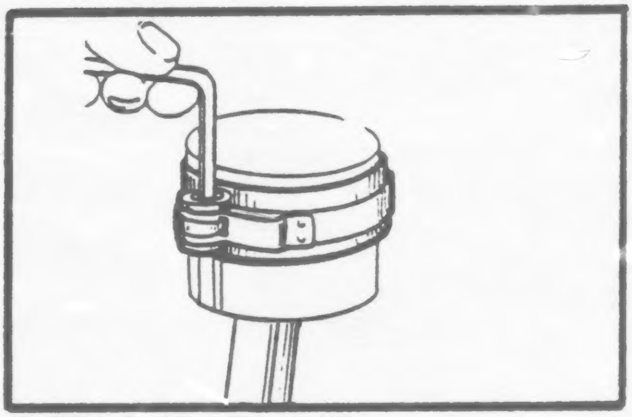
"TURN THE PAGE"

JOB STEPS

READ:

LOOK:

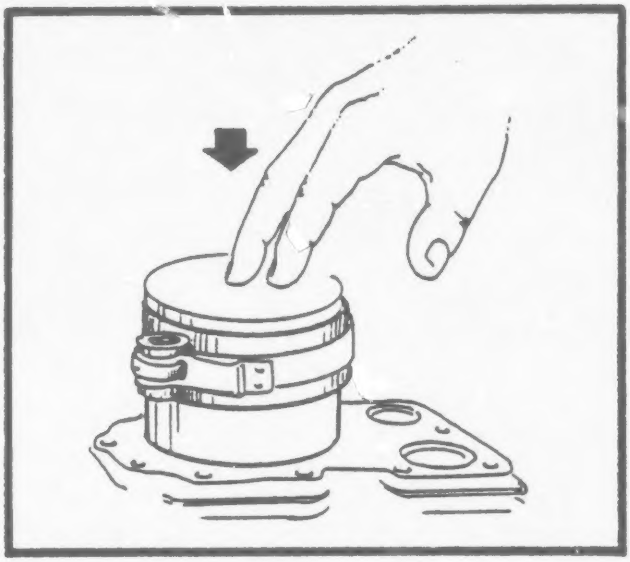
67. INSTALL THE PISTON RING COMPRESSOR AND BE SURE TO COAT THE PISTON AND RINGS WITH OIL (USE MOD # 7501 [illegible] 002 1/ 7501 23 002 3).



CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

1. CLEANED ALL THE PARTS AND KEPT THEM IN ORDER.
2. REBORED AND DEGLAZED THE CYLINDER.
3. INSTALLED THE RINGS ON THE CYLINDER.
4. CHECKED THE END GAP OF THE RINGS.
5. THE WRIST PIN LOCKED IN TIGHT.
6. INSTALLED THE NEW RINGS ON THE PISTON.
7. INSTALLED THE PISTON RING COMPRESSOR.
8. COATED THE RINGS AND PISTON WITH OIL.

68. CAREFULLY INSTALL THE PISTON AND ROD ASSEMBLY IN THE CYLINDER. BE SURE THAT THE ROD IS GOING BACK IN THE CORRECT PLACE (USE MOD #7501 01 009 1/7501 01 009 3).



"TURN THE PAGE"

WORD GUIDE

LUBRICATE - GREASE OR OIL TO MAKE SLIPPERY AND PREVENT WEAR

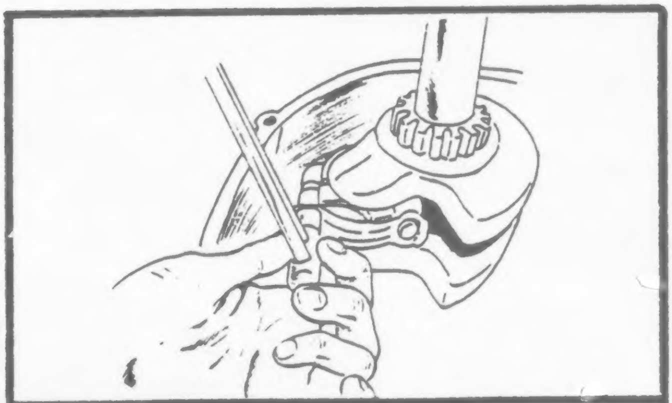
JOB STEPS

READ:

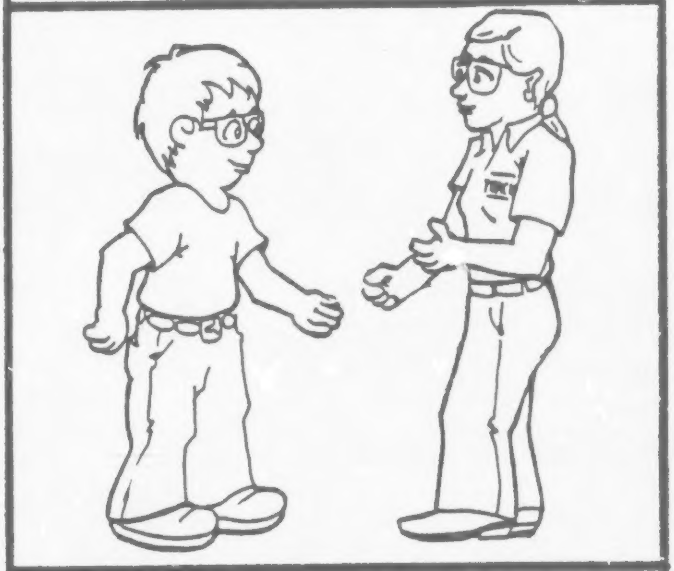
LOOK:

69. BE SURE TO LUBRICATE OR OIL THE ROD OR CRANK PIN OF THE CRANKSHAFT.

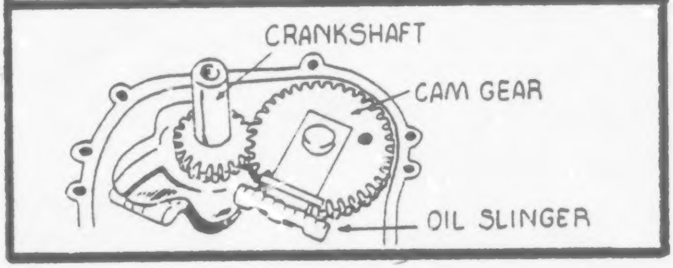
70. INSTALL THE ROD CAP, AND TORQUE TO PROPER SPECIFICATION (USE MOD #7501 01 009 1/ 7501 01 009 3).



71. BEND THE ROD LOCKS, IF USED. HAVE THE INSTRUCTOR CHECK THE ROD LOCKS OR YOU WILL HAVE TO DISASSEMBLE IT LATER.



72. IF THE ENGINE IS A VERTICAL SHAFT, INSTALL THE OIL SLINGER, IF USED (USE MOD #7501 01 025 1/ 7501 01 025 3).



"TURN THE PAGE"

WORD GUIDE

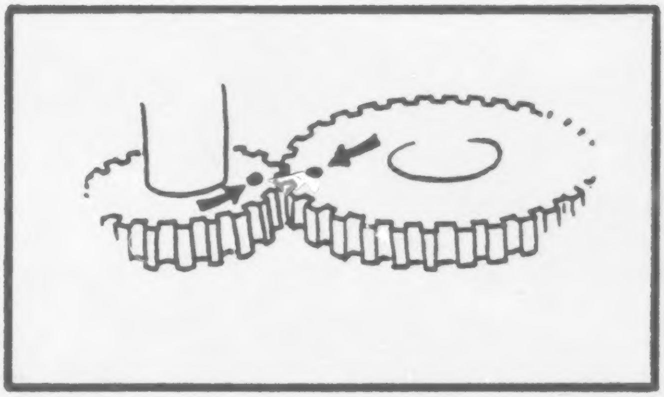
ALIGN - PUT IN PROPER POSITION

SHRIVELLED - SHRUNKEN, MADE SMALL

JOB STEPS

READ: LOOK:

73. INSTALL THE TAPPETS AND CAMSHAFT (BE SURE TO LUBRICATE THE CAMSHAFT BEARINGS) AND BE SURE TO ALIGN THE TIMING MARKS. NOW, HAVE THE INSTRUCTOR GIVE A FINAL CHECK OR YOU WILL HAVE TO TAKE IT APART LATER (USE MOD #7501 01 004 1/ 7501 01 004 3).

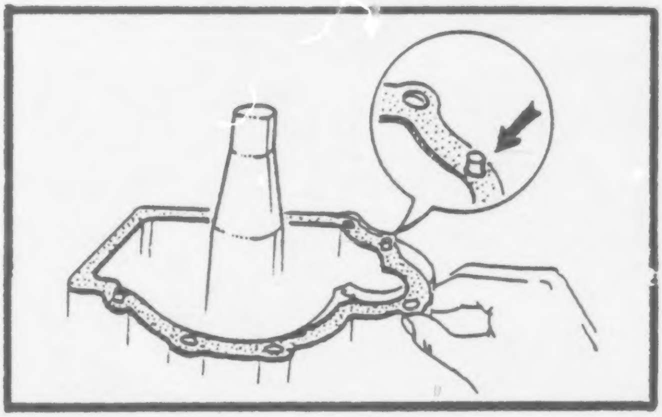


CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

1. INSTALLED THE PISTON AND ROD ASSEMBLY IN THE CYLINDER CORRECTLY.
2. GREASED THE ROD OR CRANK PIN OF THE CRANKSHAFT.
3. INSTALLED THE ROD CAP, AND TORQUED PROPERLY.
4. BENT THE ROD LOCKS (IF USED).
5. INSTALLED THE OIL SLINGER (IF USED).
6. INSTALLED THE TAPPETS AND CAMSHAFT.
7. LUBRICATED THE CAMSHAFT BEARING.
8. ALIGNED THE TIMING MARKS.

74. PUT A NEW GASKET ON THE BLOCK.

NOTE: IF THE GASKET IS SHRIVELLED OR DOES NOT QUITE FIT, YOU WILL HAVE TO SOAK IT IN WATER.



"TURN THE PAGE"

WORD GUIDE

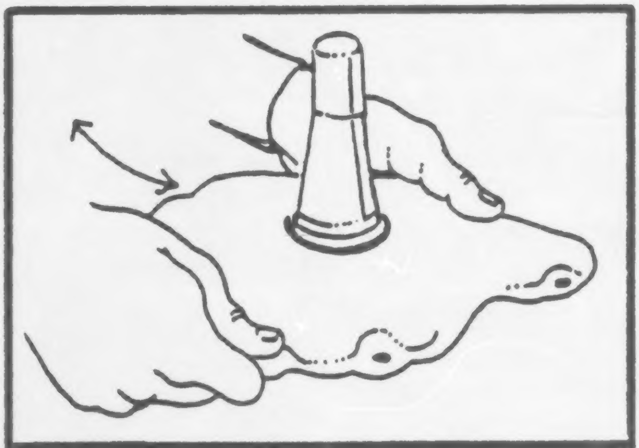
MESHED - ALIGNED WITH, LINKED TO; ATTACHED

JOB STEPS

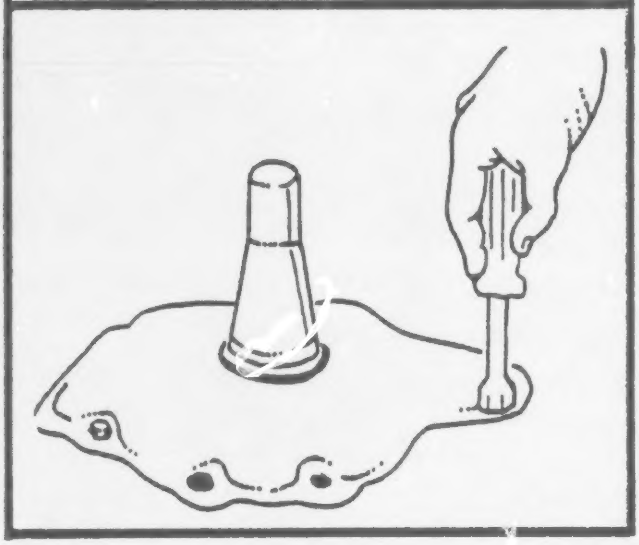
READ: LOOK:

75. BE SURE TO LUBRICATE THE OTHER MAIN BEARING AND PUT IN THE SUMP (USE MOD 7501 01 001 1/ 7501 01 001 3).

NOTE: IF YOU HAVE A MECHANICAL GOVERNOR GEAR ON YOUR SUMP, AND (AS YOU PUSH IT DOWN THE SHAFT) IF THE SUMP DOESN'T GO ALL THE WAY DOWN TO THE BLOCK, DON'T FORCE THE SUMP BECAUSE THE PLASTIC GOVERNOR GEAR MAY NOT BE MESHED WITH THE CAM GEAR. WITH ONE HAND, GENTLY PUSH THE SUMP TOWARD THE BLOCK AND, WITH THE OTHER HAND, TURN THE CRANKSHAFT UNTIL THE GEAR ALIGNS WITH THE OTHER GEAR, AND THE SUMP SLIDES ALL THE WAY TO THE BLOCK. NEVER HAMMER IT.



76. WITH YOUR WRENCH OR SOCKET SET, INSTALL TWO BOLTS AND TIGHTEN THEM (OR TORQUE, IF THERE IS A SPEC GIVEN IN THE REPAIR MANUAL).

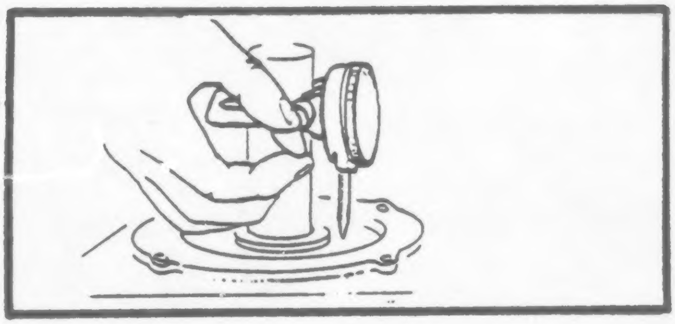


"TURN THE PAGE"

JOB STEPS

READ: LOOK:

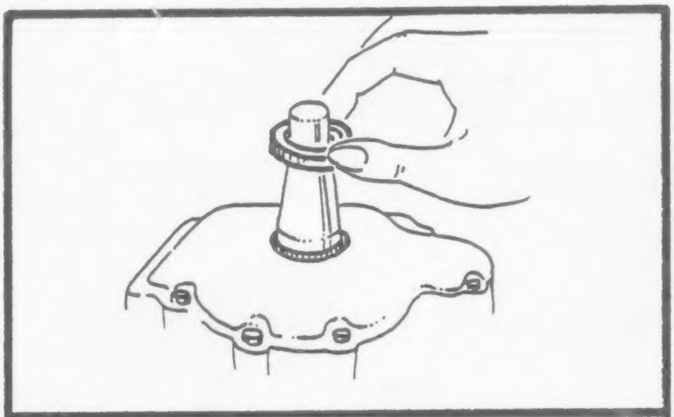
77. CHECK END PLAY IN THE CRANKSHAFT AND ADJUST IF NEEDED (REMEMBER MOD #7501 01 017 1/7501 01 017 3). →



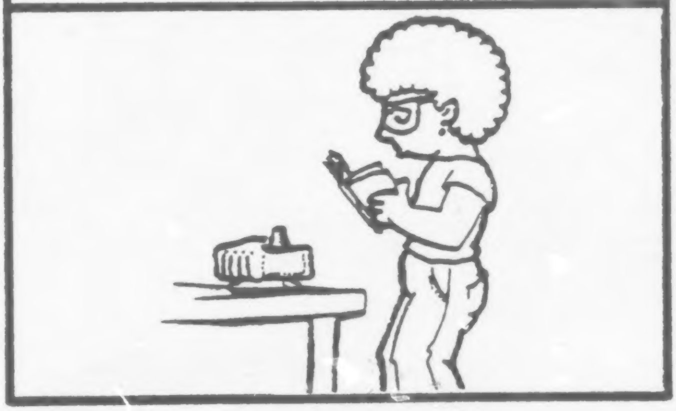
CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

1. LUBRICATED THE OTHER MAIN BEARING.
2. INSTALLED THE PUMP.
3. CHECKED THE MECHANICAL GOVERNOR GEAR
4. INSTALLED THE TWO BOLTS AND TIGHTENED THEM.
5. CHECKED THE END PLAY IN THE CRANKSHAFT.

78. INSTALL BOTH OIL SEALS (USE MOD #7501 01 001 1/7501 01 001 3). →

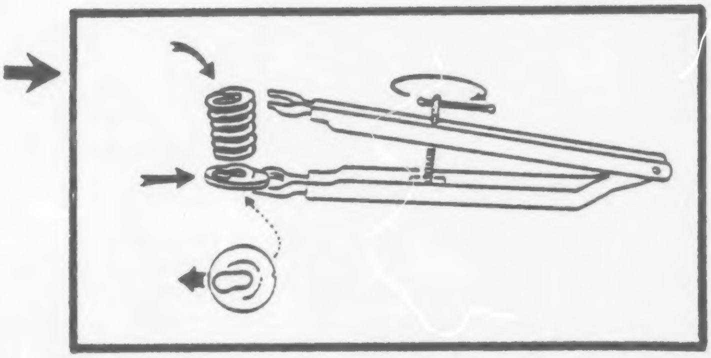


79. NOW YOU 'RE READY TO INSTALL THE VALVES. WITH THE CHART, FIRST CHECK THE VALVE CLEARANCE WITH YOUR FEELER GAUGE. →



"TURN THE PAGE"

JOB STEPS

READ:	LOOK:
80. WITH YOUR VALVE GRINDER, GRIND THE PROPER CLEARANCE ON THE VALVE STEM (USE MOD # 7501 24 010 1/7501 24 010 3).	
82. HOOK UP THE VALVE SPRINGS AND RETAINERS (USE MOD # 7501 24 002 1/7501 24 002 3).	
81. INSTALL THE VALVES.	

CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

1. INSTALLED BOTH OIL SEALS.
2. PROPER VALVE CLEARANCE.
3. GROUND FOR PROPER CLEARANCE ON THE VALVE STEM AND INSTALLED THE VALVES.

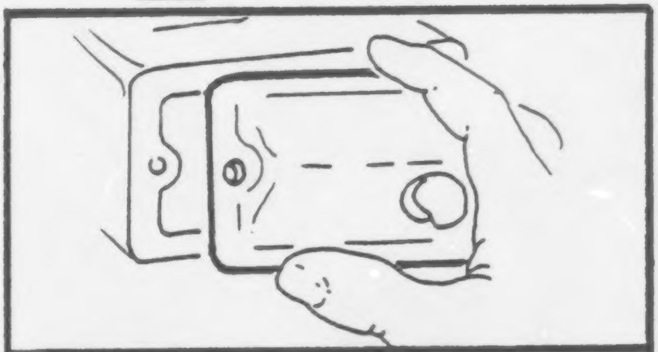
"TURN THE PAGE"

JOB STEPS

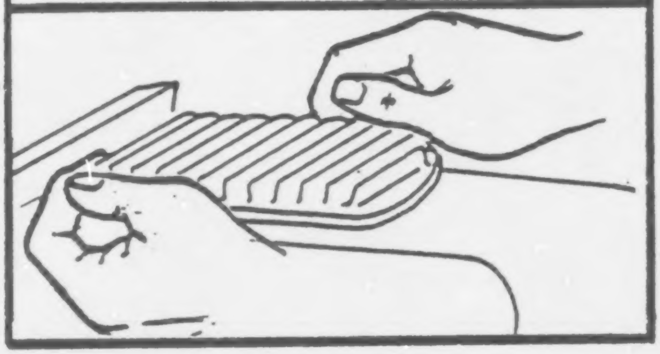
READ:

LOOK:

83. PUT ON THE VALVE BREATHER ASSEMBLY AND BE SURE THAT THE DRAIN HOLE FOR THE OIL IS POINTING DOWN.



84. RESURFACE THE HEAD. IF YOU DON'T REMEMBER HOW, USE MOD # 7501 01 003 1/7501 01 003 3.

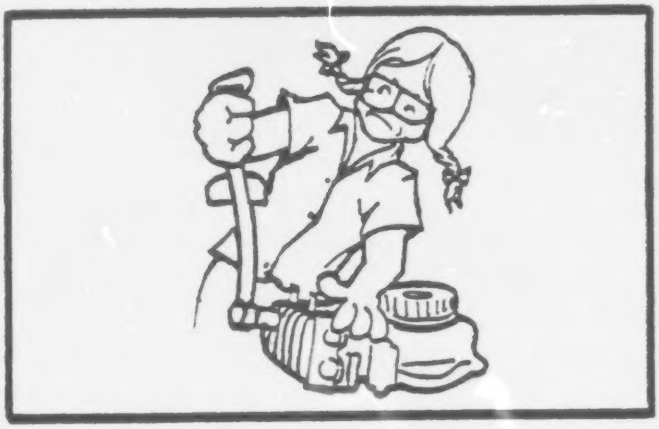


CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

1. HOOKED UP VALVE SPRINGS AND RETAINERS.
2. PUT ON THE VALVE BREATHER ASSEMBLY WITH THE DRAIN HOLE FOR THE OIL POINTING DOWN.
3. RESURFACED THE HEAD.

85. INSTALL THE HEAD AND TORQUE IT TO THE PROPER SPECS.

NOTE: ALSO, BE SURE TO INSTALL ANY SHROUDING OR SHUT-OFFS THAT GO UNDER THE HEAD BOLTS. ON TECUMSEH, DO THIS STEP AFTER TIMING THE MAG (USE MOD # 7501 01 003 1/7501 01 003 3).



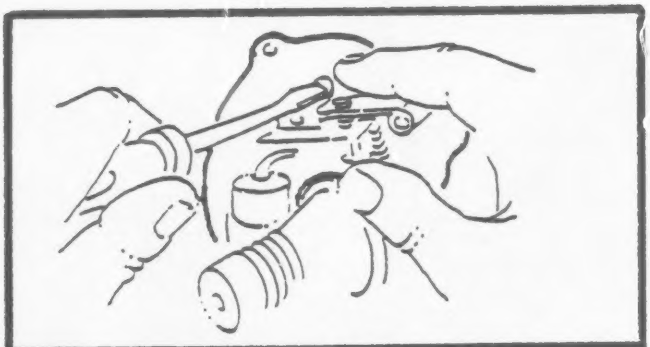
"TURN THE PAGE"

JOB STEPS

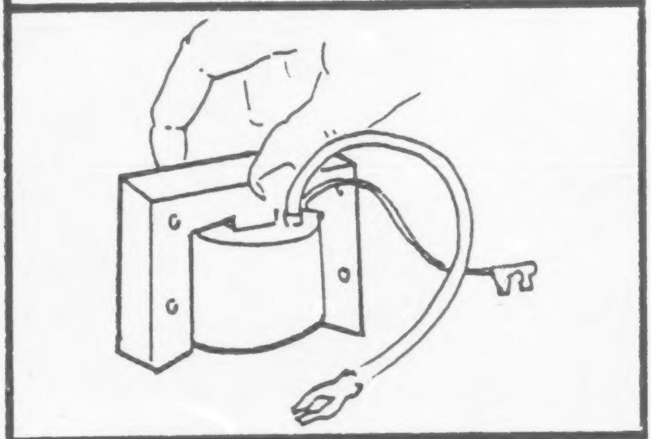
READ: LOOK:

86. START WORKING ON THE MAGNETO BY INSTALLING THE POINT PLUNGER.

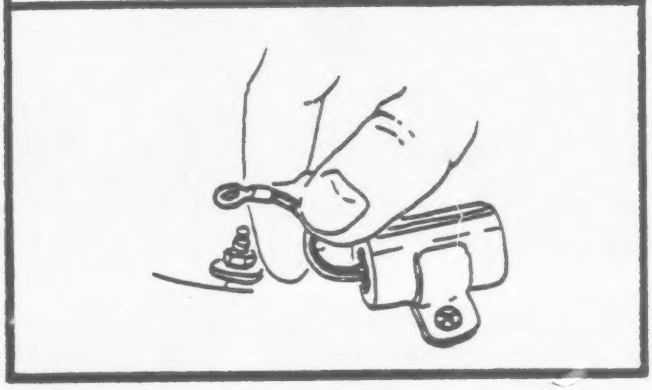
87. INSTALL THE POINTS.



88. INSTALL THE COIL.



89. INSTALL THE CONDENSER (USE A MOD FROM UNIT 8).

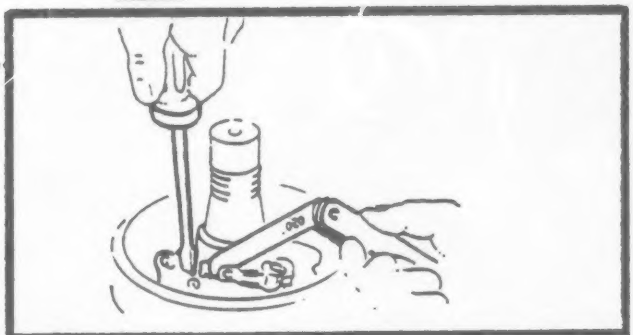


"TURN THE PAGE"

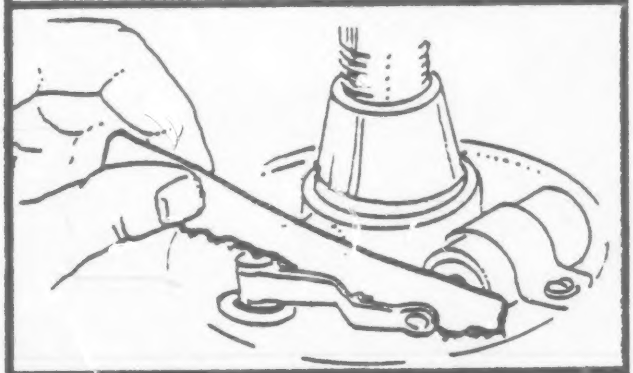
JOB STEPS

READ: LOOK:

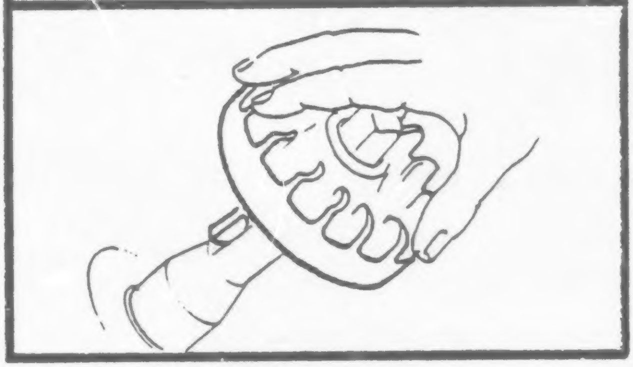
90. SET THE POINTS ACCORDING TO MANUFACTURER'S SPECIFICATIONS (USUALLY .020).



91. WIPE A CLEAN PIECE OF LINTLESS PAPER THROUGH THE POINTS TO CLEAN THEM.



92. INSTALL THE FLYWHEEL.



CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

1. INSTALLED THE HEAD AND TORQUED IT.
2. INSTALLED THE POINT PLUNGER, POINTS, COIL AND CONDENSER.
3. SET THE POINTS.
4. CLEANED THE POINTS.
5. INSTALLED THE FLYWHEEL.

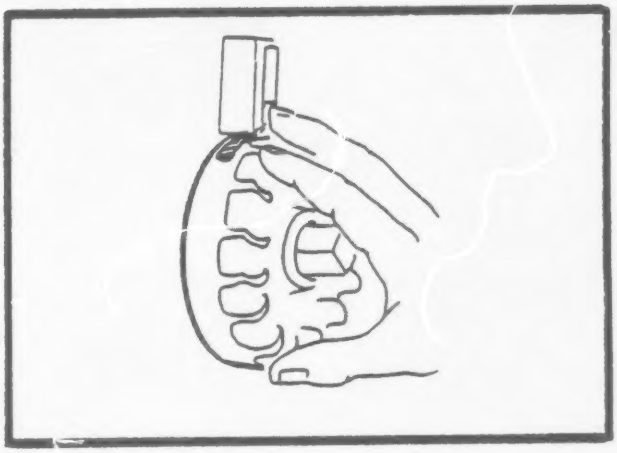
"TURN THE PAGE"

JOB STEPS

READ:

LOOK:

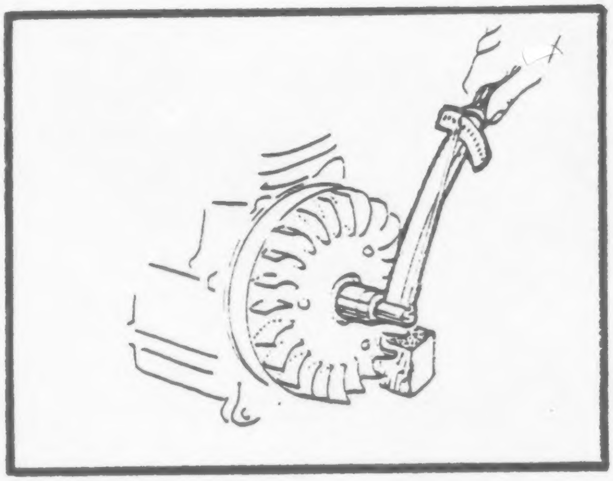
93. SPIN THE FLYWHEEL TO CHECK FOR SPARKS.



94. IF YOU SEE A SPARK, INSTALL THE COVER ON THE POINTS AND RECHECK FOR SPARK.

95. THEN INSTALL THE FLYWHEEL NUT OR CLUTCH.

NOTE: IF CLUTCH IS USED TO HOLD ON THE FLYWHEEL, BE SURE TO OIL OR GREASE THE SHAFT (USE MOD #7501 08 001 1/ 7501 08 001 3).



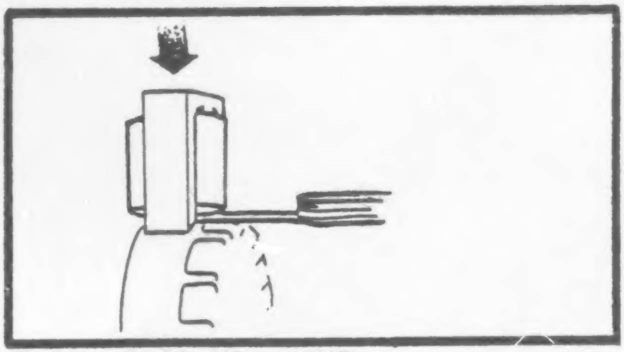
"TURN THE PAGE"

JOB STEPS

READ: LOOK:

96. ADJUST THE ARMATURE OR COIL CLEARANCE TO THE FLYWHEEL.

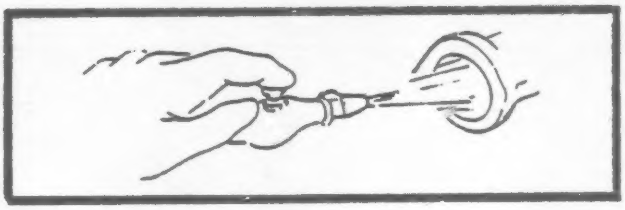
THIS INFORMATION WILL BE ON THE CHART (USUALLY .010).



CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

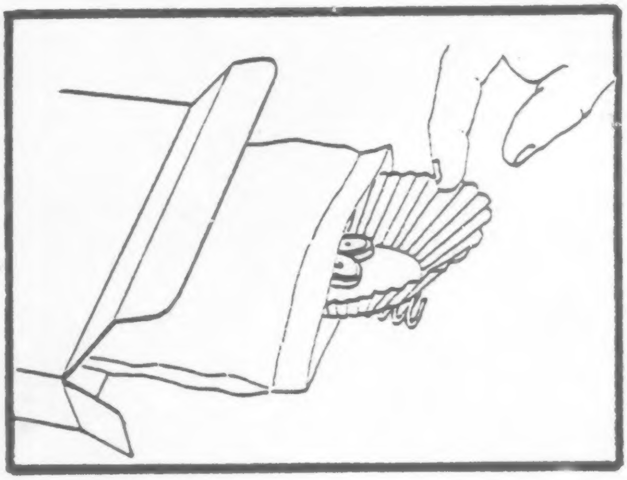
1. SPUN THE FLYWHEEL FOR SPARKS.
2. INSTALLED THE COVER ON THE POINTS AND RECHECKED FOR SPARK.
3. INSTALLED THE FLYWHEEL NUT OR CLUTCH.
4. ADJUSTED THE ARMATURE OR COIL CLEARANCE TO THE FLYWHEEL.

97. TAKE THE CARBURETOR FROM THE CARB CLEANER AND BLOW IT DRY WITH THE AIR HOSE.



98. OPEN THE CARB REPAIR KIT IN ORDER TO CHECK THAT ALL THE PARTS ARE THERE.

NOTE: IF THERE ARE INSTRUCTIONS IN THE CARB KIT, READ THEM BEFORE TRYING TO PUT IT BACK TOGETHER (USE A MOD FROM UNIT 5).

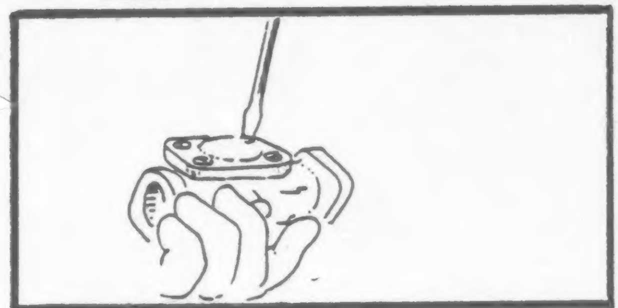


"TURN THE PAGE"

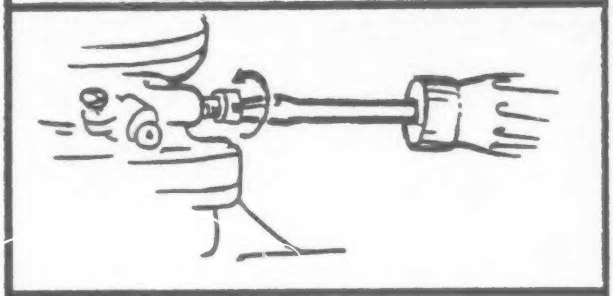
JOB STEPS

READ: LOOK:

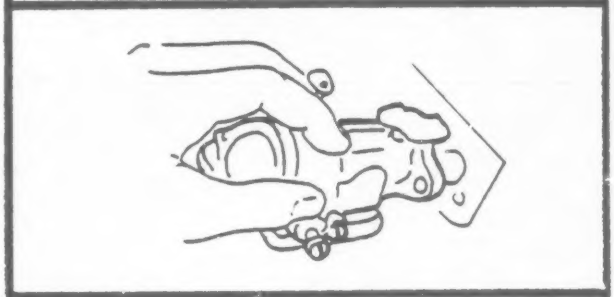
99. PUT THE CARBURETOR TOGETHER.



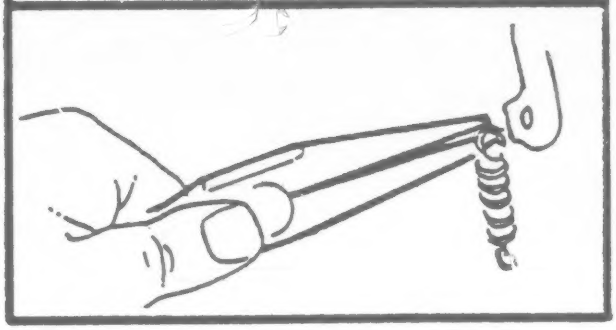
100. CHECK FLOAT LEVEL AND NEEDLE ADJUSTMENT. IT IS USUALLY 1 1/2 TO 2 TURNS (SEE UNIT 5 MODS IF YOU NEED HELP).



101. INSTALL THE CARB BACK ONTO THE MANIFOLD OR BLOCK.



102. HOOK-UP THE GOVERNOR LINK TO THE PROPER HOLE IN THE THROTTLE PLATE OF THE CARB.



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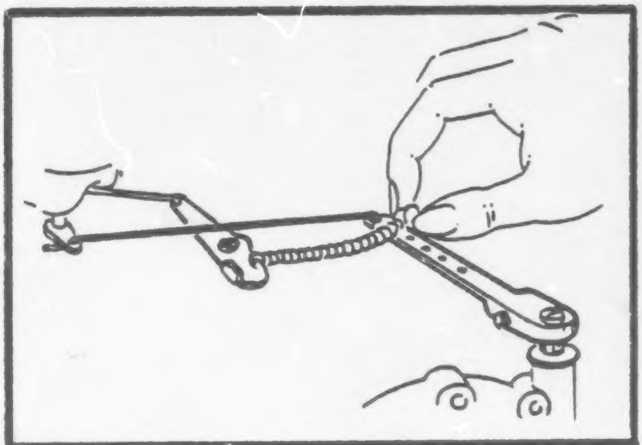
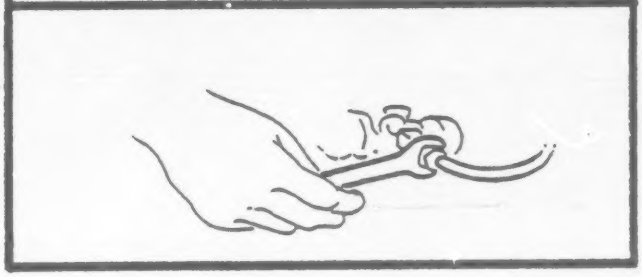
JOB STEPS

READ: **LOOK:**

103. BE SURE TO ADJUST THE GOVERNOR LINKAGE AND CHECK THAT ALL OF THE LINKAGE IS FREE FROM BINDING. →



104. CONNECT FUEL LINE. →



CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

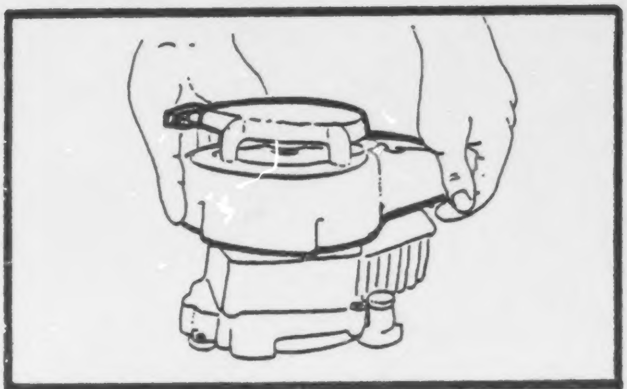
1. PUT THE CARBURETOR BACK TOGETHER CORRECTLY.
2. CONNECTED THE CARB BACK ONTO THE MANIFOLD OR BLOCK.
3. HOOKED UP THE GOVERNOR LINK IN THE PROPER HOLE.
4. INSTALLED THE CARB ONTO THE ENGINE.
5. ADJUSTED THE GOVERNOR LINKAGE AND CHECKED THAT ALL LINKAGE IS FREE FROM BINDING.
6. CONNECTED THE FUEL LINE.

"TURN THE PAGE"

JOB STEPS

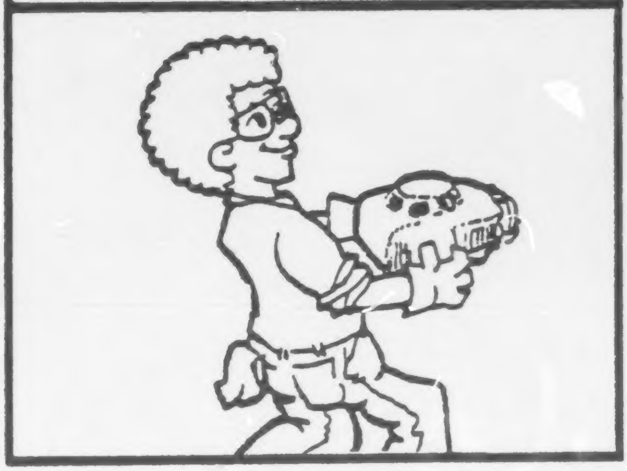
READ: LOOK:

105. INSTALL THE AIR HOUSING OR STARTER ASSEMBLY (USE MOD # 7501 05 006 1/7501 05 006 3).

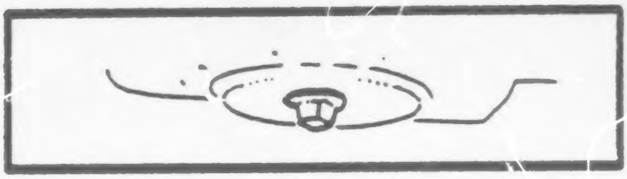


106. BE SURE THE AIR FILTER HAS BEEN CLEANED PROPERLY AND IF NEEDED, REOILED (USE MOD # 7501 02 001 1/7501 02 001 3).

107. MOUNT THE ENGINE (USE A MOD FROM UNIT 15).



108. PUT ON THE OIL CRANKCASE NUT (BE SURE NOT TO STRIP THE THREADS).



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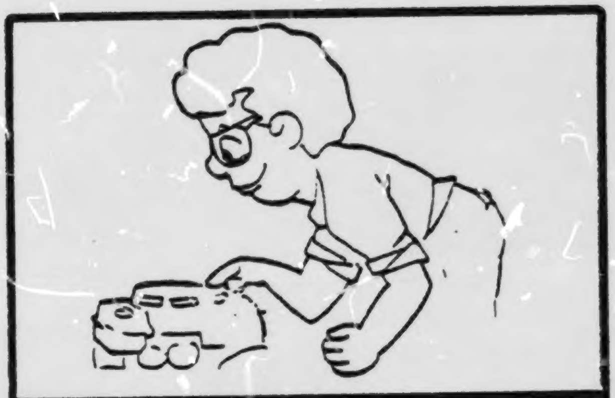
JOB STEPS

READ:

LOOK:

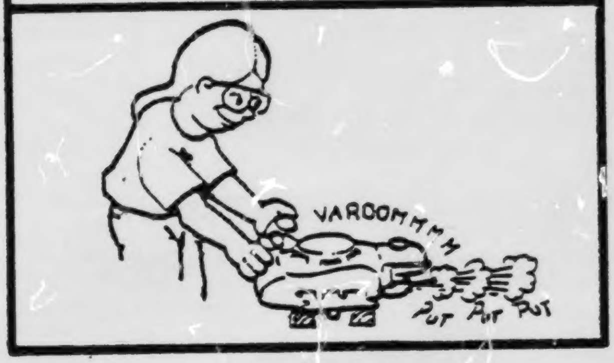
109. FILL THE ENGINE WITH OIL. CHECK THE OIL LEVEL.



110. START, ADJUST AND CHECK FOR OIL LEAKS.

USE MOD #7501 05 007 1/7501 05 007 3.

NOTE: IF THE ENGINE USED IS ONE FROM A ROTARY MOWER, BE SURE TO USE THE TACHOMETER TO CHECK TOP SPEED WARNING. DO NOT EXCEED THE BLADE TIP SPEED LAW.



CHECK: ASK YOUR INSTRUCTOR TO CHECK THAT YOU HAVE:

1. INSTALLED AIR HOUSING OR STARTER ASSEMBLY.
2. CHECKED AIR FILTER.
3. MOUNTED THE ENGINE CORRECTLY.
4. FILLED ENGINE WITH OIL.
5. STARTED, ADJUSTED AND CHECKED FOR OIL LEAKS.